

# Science in Focus

世界を見渡す科学の眼

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## はじめに

本書 *Science in Focus* (『世界を見渡す科学の眼』) は、ヒューマンな視点から日常の科学を読み解き、科学の未来を探る意図で作られた英語総合テキストです。

中心となる 15 篇の科学エッセイは、編集チームのメンバーであり、長年、日本での英語教育に携わっているケヴィン・クレアリーが本書のために書きおろしました。科学エッセイと言っても、専門用語や予備知識を必要とする学説などはほとんど登場しません。語句、構文ともにリズムカル且つ平易な英語なので、理系・文系を問わず楽しめます。題材も同様で、ひとしく読者の興味を刺激するトピックを揃えました。増加する大寒波の襲来に着目、定説化した地球温暖化をメカニズムの面から検証する *Out of Ice — Are we running out of time?* を冒頭に、以下、生命体存在の期待がかかる太陽系外惑星 (Unit 2 *Extrasolar Planet — Hunting for a new Earth*)、医学の父ヒポクラテスにさかのぼって語られる医療倫理 (Unit 3 *For the Benefit of the Patient — A “new” approach in medicine*)、樹木の香り成分に効用の秘密がありそうな森林散策 (Unit 8 *Forest Therapy — Healthy air from Mother Nature*)、似ていると親近感を、似すぎていると嫌悪感を人に与えるヒューマノイド (Unit 9 *The Uncanny Valley — Some robots are just creepy*)、交配技術に代表されるバラ栽培のテクノロジー (Unit 12 *The Rose — High-tech beauties are on the way*)、生物の生態を工業製品に活かす生物模倣 (Unit 13 *Biomimicry — Nature knows first — and best*) などの話題が続きます。

詳細は「本書の使い方」で述べますが、この科学エッセイの後ろには内容理解度を測る 4 種類の Exercises が配されています。解答を導く過程で何度もエッセイに立ち返り、理解が深まることを目指しています。じゅうぶん理解が進んだところで最後に取り組むのが *Stepping Stone* の読解です。ミニリーディングの体裁をとったこのコーナーは、各章のユニットに関連した付録のトピックが扱われています。たとえば Unit 1 *Out of Ice* では「グリーンランドの氷床コア」が、Unit 2 *Extrasolar Planet* では「火星への片道ミッション」がそれぞれテーマです。

興味深い内容が明確な論理的構造をもって展開する「科学エッセイ」と、英語の総合的力底上げを狙う「Exercises」、そして読みこんだエッセイを別角度から再度眺める趣旨で置かれた「Stepping Stone」— これらの組み合わせから成る本書は、読者を知らず知らずにエキサイティングな英語学習へと誘ってくれるはずです。そして、本書の核にあたる 15 篇のエッセイを貫く人間味豊かな語り口は、英語学習というアプローチを超え、読むという行為を楽しくさせてくれるものと信じます。

最後に、本書の完成に至るまで、成美堂の工藤隆志氏には強力なサポートをいただきました。ここに記して厚くお礼を申し上げます。

2011年 編著者

## 本書の使い方

各章は6ページ構成です。エッセイのテーマ紹介を兼ねる日本語イントロダクションから始まり、**Vocabulary Check**が続きます。Vocabulary Check は、運用能力が身につくフーズレベルでの空所補充問題です。選択肢の単語はエッセイに使われているので、予備学習を兼ねています。

語彙面での準備が整ったところで **Reading** に進みます。「はじめに」にトピックの具体例を挙げましたが、テーマを提供しているのは常に身近な科学です。じっさいに見えるもの、感じられるもの、手に取れるもの、体験できるものを優先的に盛り込みました。分野のバランスにも配慮いたしましたので、環境、健康／医療、生物、エネルギー、天体といった諸分野が偏りなくそろっています。英文の長さは平均 750 words で、実力アップを図る中級学習者に適切な語彙、イディオム、構文から成り立っています。質・量ともに通常の英語学習はもちろん、TOEIC、TOEFL、英語検定などの対策にも有効なテキストとなるはずです。**NOTES** には、語注と事項注の両方を含みました。適宜参照することで、スムーズな読解が可能になります。

Reading の学習後は、**Exercises** に取り組みます。4種類のパターンが用意されているので、多角的に学習成果がチェックできます。最初の **I Judgment: True or False?** は内容真偽を問う T/F 問題です。2番目の **II Making a Choice** は空所を埋めて内容を表す文章を完成させる3択の問題です。次の **III Passage by Passage** は、本文中の段落番号にしたがってパッセージごとの要旨を空所補充問題を解きながら作成するユニークな演習です。狙いは、パッセージを追いかけてながらエッセイ全体の内容を正確に把握する点にあります。最後の **IV In Practice** は作文練習です。3段階に分かれているのが特徴で、まず、学習中のエッセイの中から、覚えておきたい重要表現／文法ポイントを探し出し、その使われ方を文中のコンテキストを踏まえて確認します。次に実例を兼ねた短文の整序問題を解いてその重要表現／文法ポイントを押さえます。学習の便宜を図るため、問題の下には参考となる簡潔な文法解説を加えました。そして最後に英作文をします。問題には取り組みやすさを考慮し、語(句)のヒントを添えました。

Exercises の後、各章の締めくくりに配した **Stepping Stone** は、エッセイのテーマに関連する内容をコンパクトにまとめたミニリーディングのセクションです。一息で読める長さを意識し、250 words で作りました。文中に5箇所の空所を設け、読解力だけでなく語彙力や文法力の見直しを図ります。エッセイ本体のテーマをさらに深めるとともに、いわば飛び石伝いに隣接する領域へ踏みこみ、新たな情報に触れていただきたいと思います。

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# Unit 1

## Out of Ice

### — Are we running out of time?

氷がなくなる



地球温暖化は急速に進んでいます。各地で干ばつの被害が伝えられる一方で、記録的な寒波や豪雪もしきりに報道されています。地球温暖化と寒波の襲来——相反する2つの現象が同時に発生している現実、どう考えたらよいのでしょうか。地球温暖化の単純ではないメカニズムを理解する必要があります。

### Vocabulary Check

Fill in each blank with the appropriate word from the list below.

- |        |                 |                |
|--------|-----------------|----------------|
| 1. a ( | ) place         | [ 被害を受けやすい場所 ] |
| 2. (   | ) conflicts     | [ 地域紛争 ]       |
| 3. a ( | ) map           | [ 地質図 ]        |
| 4. a ( | ) closure       | [ 一時閉鎖 ]       |
| 5. (   | ) opportunities | [ 前例のない機会 ]    |

geological   regional   temporary   unprecedented   vulnerable

### Reading

 1-03

**1** In recent years, ice has been disappearing from many parts of the Earth. Glaciers in the Alps and the Andes are receding. The winter ice cap at the North Pole has gotten smaller year after year. The ice sheet covering Antarctica is getting thinner. As a result of all this melting ice, the volume of water on the surface of the planet is continually increasing. The rising sea level will eventually reclaim low-lying land— the Maldives, coastal areas of Bangladesh and South Pacific island nations are especially vulnerable. At worst, island nations such as Tuvalu will have to relocate

5

all of their residents to new countries, as it appears that their land will be completely underwater later this century.

10 **2** The melting of polar ice has dire consequences for animals and regional ecosystems. For example, ice is the natural habitat for the Alaskan polar bear. These animals live on the Arctic ice, and hunt  
15 seals on the ice near the water's edge. Until recently, they could spend most of the year on the ice, hunting and eating the seals that live under the ice. During the few months when the ice shrank, they would stay on



Polar bears on pack ice.

20 land and wait for the next hunting season to start. Now, the ice recedes farther and more quickly than before, greatly shortening the time that bears can find food. The bears are thus having trouble raising cubs and hibernating, two activities that require the use of a lot of stored-up energy.

**3** Scientists have predicted that if the atmosphere and the Arctic continue to get  
25 warmer, the entire ice cap is in danger of disappearing by the end of the century. The warmer the Arctic becomes, the faster the Arctic ice melts. As heat-absorbing water replaces heat-reflecting ice, the ice cap will continue to get warmer and even more ice will melt. There seems to be no stopping this feedback loop. If this cycle continues, polar bears, walruses and other species that depend on ice to survive will  
30 completely disappear from the Arctic.

**4** Still, even though much of the Earth's ice is disappearing, the huge ice sheets that exist in Antarctica and Greenland are signs that we are in a geological ice age. To be precise, the Earth is in an "interglacial" period of an ice age. Interglacial periods

## NOTES

**2. ice cap** 「氷冠」 半永久的に雪氷で覆われた極地の広い地域。 **2. the North Pole** 「北極」 **3. ice sheet** 「氷床」 広い土地を覆う厚い氷。 **3. Antarctica** 「南極大陸」 **5. reclaim low-lying land** 「海拔の低い土地を取り戻す」 **6. the Maldives** 「モルジブ諸島」 南西インド洋上にある群島。島の80%以上が海拔1メートルに満たない。 **6. Bangladesh** 「バングラディシュ」 インドの東側、インド洋に面した国。国土の90%が海拔9メートル以下。 **6. South Pacific island nations** 「南太平洋の島国」 たとえば7行目の Tuvalu (ツバル) は平均海拔が1.5～2メートル。 **7. vulnerable** 「(被害を)受けやすい」 **7. relocate** 「移住させる」 **10. dire** 「悲惨な」 **12. natural habitat** 「天然のすみか」 **15. seals** 「アザラシ」 **22. raising cubs and hibernating** 「子育てと冬眠が」 **26. heat-absorbing water** 「熱を吸収する水」 名詞と動詞の現在分詞形がハイフンでつながれた形容詞。次の行の heat-reflecting ice も同パターン。 **28. There seems to be no stopping this feedback loop.** 「このフィードバックプロセスを止めることは無理なようだ」 feedback loop は生まれた結果がその原因を増幅させる循環プロセス。 **29. walruses** 「セイウチ」 **32. ice age** 「氷河時代」 **33. "interglacial" period** 「"間氷"期」

typically last for 12,000 years. These relatively warm periods separate the times of colder weather, known as “glacial periods,” that exist within an ice age. Our recent warming trend is thus just one aspect of the planet’s changing climate. 35

5 There is scientific evidence that human activity — smoke-spewing chimneys, carbon-emitting cars, and the destruction of carbon-trapping forests — seems to be contributing to our warming climate. Even so, many people argue we should not worry about the climate or our contribution to how it changes. They note that the climate has greatly changed many times over the billions of years that the Earth has existed. Thus, they argue, we should tolerate or ignore this current, temporary warming period. Soon enough, it will naturally end, no matter what we do. 40

6 In addition, many people doubt that global warming exists because the past few years have brought about severe cold waves, especially in Europe and North America. Many cities have had record levels of snow and vulnerable people have frozen to death. Burst water pipes and snapped power lines have paralyzed cities that rarely, if ever, had bitterly cold winters. Unexpected or unprecedented cold snaps have resulted in crop failures in the countryside. Doesn’t all this cold weather make it hard to believe that we are in an age of global warming? 50

7 Surprisingly, it seems that our warming climate is bringing about harsher winters. The theory is that as the Arctic ice cap melts, fresh water pours into the North Atlantic Ocean. This huge increase in fresh water alters oceanic circulation patterns so that less warm water makes its way to the north. As a result of these new conditions, average temperatures may drop by 5 °C in Asia, Europe, and North America. In other words, a warmer North Pole could paradoxically cause freezing conditions elsewhere. 55

8 The great cycles of ice ages and interglacial periods are surely beyond human control, but shouldn’t we do what we can to prevent our activity from making a bad situation worse? Reducing the effect that human activity has upon global warming could prevent the worst-case scenarios from occurring. We need to develop clean 60

## NOTES

35. “glacial periods” 「氷期」 この期間は、中緯度圏の非山岳地域にも氷河がみられた。37. smoke-spewing chimneys 「煙を吐き出す煙突」 38. carbon-trapping forests 「炭素を取り込む森林」 41. over the billions of years 「何十億年にもわたって」 42. should tolerate or ignore 「(当然)許容ないし無視してよいはずだ」 43. naturally 「ひとりでに」 47. Burst water pipes and snapped power lines 「破裂した水道管や切れた送電線」 47. cities that rarely, if ever, had bitterly cold winters 「たとえあったとしても、めったに厳しい冬を経験してこなかった都市」 48. Unexpected or unprecedented cold snaps 「想定外の、ないし過去に例がない寒波」 49. crop failures 「穀物の不作」 51. Surprisingly, 「驚くべきことに」 文全体にかかる文修飾の副詞。Certainly, Curiously, Naturally など。Unit 3 の In Practice 参照。52. fresh water 「淡水」 53. oceanic circulation patterns 「海流の動き」



energy sources, minimize the effect we have on the climate, and protect vulnerable ecosystems and the species that live in them. If we achieve these goals, then we can leave our descendants a world that they will be happy to inherit. Otherwise, they  
65 may curse us from their barren, stricken Earth.

### NOTES

64. descendants 「子孫」

## Exercises

### I Judgment: True or False?

Circle *T* if the sentence is true, or *F* if it is false.

1. T / F The polar bear population will thrive as the sea temperature rises.
2. T / F The huge ice sheets on Earth show that we are still in an ice age.
3. T / F Unexpected cold snaps disprove the theory that we are in a period of global warming.

### II Making a Choice

Complete each sentence with the best option.

1. If global warming continues, entire species in the Arctic may [ A appear B disappear C reappear ].
2. Forests can slow down global warming because they [ A emit B spew C trap ] carbon dioxide.
3. The past few years have been notable for the presence of unusually [ A thick Arctic ice B salty seawater C harsh winters ].

### III Passage by Passage

Fill in each blank using an appropriate word from the passage. Change the form if necessary. The first letter or syllable is given as a hint.

#### [ 1<sup>st</sup> passage ]

As a result of global warming, ice is melting and ( *gla* ) on tall mountains are ( *re* ). Also, the volume of seawater is ( *in* ), a phenomenon which threatens low-lying land.

#### [ 2<sup>nd</sup> passage ]

Polar bears are dependent on ice for ( *h* ) and eating seals. If this ice

continues to disappear, the results will be disastrous for them, as they will find it difficult to ( *r* ) cubs or hibernate.

[ 3<sup>rd</sup> passage ]

As the air temperature gets warmer, the Arctic ice, which ( *re* ) heat, will be replaced by heat-( *ab* ) water. The warm water will melt more ice, which will increase the amount of water, and thus lead to more warming, which may eventually result in all ice vanishing from the ( *Are* ).

[ 4<sup>th</sup> & 5<sup>th</sup> passages ]

The Earth is now at the end of one of its ice ages, or, to be more ( *pre* ), in a time called an interglacial period. These periods are comparatively warm times in an ice age. Thus, the effect of human industrial activity may not be the only thing ( *con* ) to global warming.

[ 6<sup>th</sup> passage ]

As they have learned of or experienced severe cold ( *s* ) recently, many people doubt that global warming really exists. Considering these increasingly ( *se* ) winters, it seems that it wouldn't be a problem if the Earth were to warm up a little bit.

[ 7<sup>th</sup> & 8<sup>th</sup> passages ]

Although it may seem strange, the very warming of Earth's general climate can bring about freezing weather in many areas. As ocean circulation ( *pat* ) change, places that once enjoyed mild climates will have harsher winters. All in all, although we can't control the climate, we should do our best to avoid making the ( *sit* ) worse, shouldn't we?

## IV In Practice

*Acquaint yourself with a useful expression through writing.*

1. First, find where the following sentences occur in the essay.
  - (a) As **heat-absorbing** water replaces **heat-reflecting** ice, . . .
  - (b) — **smoke-spewing** chimneys, **carbon-emitting** cars, and the destruction of **carbon-trapping** forests —
2. Put the scrambled words in order.
  - (a) They are developing a [ -centered / learning / student / method ].  
\_\_\_\_\_
  - (b) The company offered a [ -average / -than / higher / salary ].  
\_\_\_\_\_

単語をハイフンでつなぐと自由に簡単な形容詞を作ることができる。1の例文では名詞に～ingがついた形が並んでいる。2-(a)に出した -centered を例にとれば、a self-centered man、a family-centered hotelのように前に名詞を置くこともできるし、soft-centered chocolate、a dark-centered flowerのように形容詞を置く場合もある。a long-term project、a well-known politician、a ten-year-old car、built-in furniture、a matter-of-fact tone、off-the-shelf clothing、an all-in-one printer など、連結する品詞は多彩。

3. Create sentences on your own, using a hyphen-linked adjective.

(a) この部屋には作り付けの食器戸棚がついている。( built / cupboard )

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(b) どうぞ、上にあげた論文に注意してください。( mention / article )

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## Stepping Stone



Complete the mini-reading by using the words below.

### Greenland Ice Core

Ice from a glacier or other ice accumulation has a lot of data locked inside. By drilling out a cylinder of ice, known as an ice core [ ], scientists can collect data that allows them to estimate what the climate was like many hundreds of thousands of years ago. The first ice core sample was taken from Greenland, as the area was fairly accessible and the region was uninhabited. Every year, snow would [ ] to the ground and accumulate. The snow would then be covered by the next year's snowfall. As the snowfalls accumulated, the snow at the bottom turned to ice. As the years went by, the ice was pushed down deeper and deeper. Thus, when scientists use a hollow drill to [ ] up a cylinder of ice, they can see each layer pressed upon the next. The ice layers are similar to tree rings, which show each year of growth. The reason that the ice core layers can give a lot of information about the climate is that as a particular year's snow falls to the ground, it will [ ] tiny amounts of dust, elements, pollen, gases, and other materials from the atmosphere. These substances stay with the snow and are preserved in the ice. When scientists [ ] the substances, and then measure how they change from one layer to another, they can reconstruct a very accurate estimate of the temperature, sea level, and other climatic conditions of a year from the distant past.

analyze   collect   fall   pull   sample