

# Our Place in the Universe

地球人類の進化と科学

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# Preface

*Our Place in the Universe* is an upper-intermediate reading comprehension book focusing on key areas of science and technology. The book's 22 units cover a wide variety of contemporary topics, which today's college and university students will find both familiar and interesting.

The topics include climate modeling, lasers, plastics, rockets and robots. The book also presents and explains some of the fundamental milestones in the history of science, such as Mendel's work in genetics and Darwin's famous voyage on the *Beagle*. Students using the book will develop their reading skills and gain exposure to scientific texts. They will also expand their science vocabulary and develop skills in interpreting visuals such as diagrams and graphs.

While presenting challenging and relevant subject matter, *Our Place in the Universe* is also written in language that is clear and "reader-friendly." This highly accessible style makes the book useful not only for science students, but also for students of English generally.

# How to use this book

## **Background information and essential words and phrases**

This introductory vocabulary activity is designed to prepare students for the main reading passage. Key vocabulary and concepts are introduced in contexts that refresh and consolidate students' existing knowledge of the topic.

## **Reading passage**

After completing the introductory vocabulary activity, students read the main passage. Ten words or phrases have been selected in each passage for study in the following vocabulary exercise. Where appropriate, the passages make reference to the accompanying diagrams. Each reading passage is also accompanied by a glossary, which gives Japanese translations of selected words and phrases.

## **Vocabulary study**

In this activity, students match ten key words or phrases from the reading passage to their correct meanings. Students are encouraged to deduce the meanings from the context, rather than using a dictionary.

## **Comprehension questions**

These multiple-choice questions test that important ideas and details from the passage have been understood. Three types of question are presented throughout the book: gap-fill style, in which students choose the correct word or phrase to fill a gap in a sentence, sentence-completion style, in which students choose the correct ending for a sentence, and question-and-answer style, in which students choose the correct answer to a question.

## **Summary and listening practice**

This activity presents a one-paragraph summary of the reading passage with several words missing. First, students draw on their comprehension of the passage to write as many words as they can. Then they listen to a recording of the summary on the accompanying CD to complete the task. As well as giving a useful example of how a summary should be written, this activity also gives students the opportunity to hear the key language of the unit in spoken form.

## **Structure and written expression**

This activity is based on TOEIC® test exercises. Students choose the correct words or phrases to complete sentences relating to the passage. This activity focuses on both the meaning of words and correct grammatical forms.

## はじめに

*Our Place in the Universe* (『地球人類の進化と科学』) は、私たちが暮らす地球や宇宙、自然現象や生命の仕組み、また、こうした事象の科学的解明に欠かせない技術について解説した中級レベルの英語読解用教科書です。具体的には、自然現象(空の色や潮の干満)、宇宙の成り立ちや宇宙探索、宇宙ごみや海洋汚染、生物の進化や絶滅、ロボットなどの興味深い22のトピックから構成されています。平易な英語で書かれているので、学生の皆さんはテキストを読み進めながら、身近な科学的知識を得ることができるでしょう。

扱うテーマは多様ですが、どのユニットも基礎的な解説ですので、今後、新聞や雑誌の科学関連記事を読む際に役立つ知識と語彙を習得することができます。この教科書は理系・文系といった学生の専攻は問いません。この学習を通して、「私たち人間は、科学技術が発展した世の中で当たり前で暮らしているが、実は、宇宙の中の地球という固有な環境で進化した生命体として暮らしている」ということをあらためて考えてもらえれば幸いです。

どんどんと読み進められるように、科学用語などには日本語の注釈を付けました。しかし、VOCABULARY STUDYの問題で取り上げられている単語には、基本的に注釈はありません。辞書を使わず、文脈から単語の意味を推測し、理解してもらいたいからです。全ての単語の意味を辞書でひくのではなく、文脈を考えながら、英語で読解する練習は大切です。一方で、理解が難しい箇所は日本語に訳してみるのも良い読解練習になります。全体把握のための速読、正確に理解するための精読など、いろいろな読み方をしてもらいたいと思います。

本書を作成するにあたり、成美堂社長の佐野英一郎氏、同社の佐藤公雄氏、松本健治氏には大変お世話になりました。また、制作を始めるにあたり、有用なコメントをいただいた芝浦工業大学教授の山崎敦子氏に感謝いたします。

# 本書の使い方

## Background information and essential words and phrases

ここに登場する語（句）は、本文への導入となるもので、キーとなる語（句）と基本的概念が取り上げられています。このユニットのテーマに関するそれぞれの文章を完成することで、皆さんはすでに学んでいる知識をよみがえらせ、それをまとめることができます。

## Reading passage

最初の語句問題を終了したら、本文へ進んでください。本文を読み終わった後の語句問題のために、10の語（句）が太字になっています。必要に応じて、本文中に挿入された図表を参照してください。本文終了に続いて、英語の語句の日本語訳・解説があります。

## Vocabulary study

文中から抜き出された10の重要語句について、それぞれの意味をa～jの中から選んでください。辞書はなるべく使わずに、文脈からその語句の意味を考えてみてください。

## Comprehension questions

この多肢選択式問題は、本文の主要点とさらにその細部についてまでを理解したかどうかを確認するものです。全ユニットを通して3つのスタイルの問題がランダムに登場します。①「穴埋め」型：文中の空欄（下線部）に入る適切な語句を選んでください。②「文完成」型：文の出だしに続いて、文を完成させるための適切な選択肢を選んでください。③「問答」型：質問に対する適切な答えを選んでください。

## Summary and listening practice

本文を1段落に要約したのですが、数語が抜け落ちています。まず最初に、皆さんの本文理解を頼りに、できるだけ空欄（下線部）を埋めてください。次にCD録音を聞いて、残りのすべての空欄に単語を記入してください。ここでは、良い要約の書き方を例示するとともに、CDを使用することで、このユニットでの重要語句・文を耳で確認する機会を提供しています。

## Structure and written expression

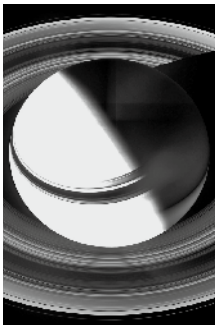
この問題は、TOEIC®で出題される文法・語彙問題のパターンを参考にしています。本文に関連する6つの文を完成するために、それぞれ適切な語（句）を選んでください。①適した意味の語（句）を選ぶ場合と②文法的に正しい語（句）を選ぶ場合の2通りがあります。

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# UNIT 1

地球から見ると月面にはいろいろな模様に見えるクレーターがありますが、どのようにしてこのクレーターはできたのでしょうか。地球にもクレーターがあることを知っていますか。

## BACKGROUND INFORMATION AND ESSENTIAL WORDS AND PHRASES


*Complete the sentences using words from the box below. You may change the form of the words.*


crater  
impact  
atmosphere  
erosion  
meteorite  
vaporize


1. The Earth's \_\_\_\_\_ is mainly nitrogen and oxygen.
2. Most solid objects that hit the Earth \_\_\_\_\_ immediately.
3. From the Earth you can see the largest of the moon's many \_\_\_\_\_.
4. Over millions of years, rocks are worn away by \_\_\_\_\_ from wind and water.
5. The \_\_\_\_\_ of a large object from space hitting the Earth can cause a lot of damage.
6. In the night sky you can sometimes see a \_\_\_\_\_ as it enters the Earth's atmosphere.

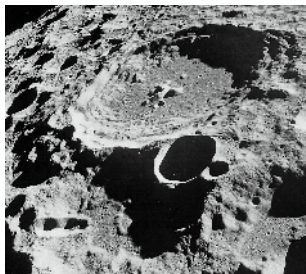


# Evidence of a Violent Past


① 02~06 


 When you look at the moon through a telescope, you can clearly see its many circular craters. These are impact craters, caused by objects such as **comets**,<sup>1</sup> asteroids and meteorites crashing into the moon at high speed. When the solar system was younger, there were many more of these objects traveling around it, crashing into planets and moons and creating impact craters. On the Earth and on Mars, many of these impact craters have disappeared. These planets have atmospheres and **surface**<sup>2</sup> water, so erosion changes the surface of the land. Over millions of years, erosion has worn the craters away or buried them. However, on places like the moon and Mercury, which have no atmosphere and no erosion, the craters remain exactly as they were when they were created.

 The American geologist Daniel Barringer was one of the first to suggest that a crater on the Earth could be an impact crater. In Arizona in the United States, there is a crater 1,200 meters across and 110 meters deep, with a **rim**<sup>3</sup> rising 80 meters above the surrounding land. In the 1920s, Barringer suggested it was the result of a meteorite hitting the Earth. Most scientists did not agree, believing it had been caused by a volcano. It was not until the 1960s that it was **universally**<sup>4</sup> accepted that some craters on the Earth are impact craters. Since then, about 170 of them have been **identified**<sup>5</sup> and more are being discovered.



Crater 308 on the moon (the large crater in this picture) is an example of a complex impact crater.

 The size of an impact crater depends on the size and speed of the object that creates it and on the **geology**<sup>6</sup> of the surface that it hits. There are two types of impact craters. Simple impact craters are small—some only 50 meters in **diameter**<sup>7</sup>—with a simple bowl-like shape. The crater that Daniel Barringer identified, now called the Barringer Crater, is one of these. Complex craters are larger—more than four kilometers across—with a more complex structure. When they were created, they had high and steep sides that **collapsed**,<sup>8</sup> forming a shallow and uneven floor. In all cases, the object that created the crater completely vaporized on impact.

 The largest known impact crater on the Earth is in Mexico. The Chicxulub Crater is about 180 kilometers in diameter and was formed 65 million years ago when an asteroid 19 kilometers wide hit the Earth. The debris released into the atmosphere cooled and darkened the Earth, and this is believed to have led to the **extinction**<sup>9</sup> of the dinosaurs. It is possible, however, that the largest impact crater on the Earth could actually be the Pacific Ocean. Many scientists believe that the Earth collided with another planet, and that this ejected a lot of the

40



45

The Barringer Crater is an example of a simple impact crater.

Earth's material into space, forming the moon, while leaving a large hole that became the Pacific Ocean.

☞ Fortunately, scientists think that objects large enough to create new impact craters are only likely to hit the Earth two or three times every million years. Nevertheless, some scientists are watching the skies for comets, meteorites or asteroids that might hit the Earth.

Others are working out how they could deflect any that might be on a **collision**<sup>10</sup> course with the Earth. Possible

methods include attaching rocket engines to these objects or using a nuclear bomb to change their course.

**impact craters** 「衝突クレーター」 **asteroid** 「小惑星」 太陽の周りを公転する小天体  
**meteorite** 「隕石」 **solar system** 「太陽系」 **Mars** 「火星」 **erosion** 「侵食」 **Mercury** 「水星」  
**Daniel Barringer** 「ダニエル・バリンジャー (1860-1929)」 米国の鉱山技術者・地質学者  
**rim** 「(円形の物体などの)縁」 隕石の衝突により中心部の穴の周囲に隆起してできた外壁のこと  
**simple (impact) crater** 「単純クレーター」 **Barringer Crater** 「バリンジャー隕石孔」  
**complex crater** 「複雑クレーター」 **Chicxulub Crater** 「チクシュループ・クレーター」 メキシコのユカタン半島にあるクレーター **debris** 「破壊物, 破片」 **dinosaur** 「恐竜」  
**deflect** 「向きをそらす」

## VOCABULARY STUDY

*Match each word with its definition. Try to guess the meaning from the context without using a dictionary.*


- |                |   |
|----------------|---|
| 1. comet       | a. the outer or top layer of something  |
| 2. surface     | b. the edge of a circle or similar shape  |
| 3. rim         | c. the end of an entire species   |
| 4. universally | d. the forceful coming together of two objects  |
| 5. identify    | e. everywhere; by everyone  |
| 6. geology     | f. to recognize something and understand what it is                                   |
| 7. diameter    | g. the nature of the rock and soil in an area   |
| 8. collapse    | h. to fall down or fall apart because of being broken                                 |
| 9. extinction  | i. the length of a straight line across a circle, through its center                  |
| 10. collision  | j. a body of ice and minerals orbiting the sun, surrounded by a cloud of gas and dust |

## COMPREHENSION QUESTIONS

*Circle the best answer, a, b, c or d, to each of these questions.*

1. The moon's impact craters were caused by:
  - a. the moon crashing into objects in space.
  - b. objects crashing into the moon.
  - c. erosion of the moon's surface.
  - d. extreme weather on the moon.
  
2. Many impact craters on the Earth and on Mars have:
  - a. become bigger.
  - b. moved.
  - c. disappeared.
  - d. stayed the same as when they were created.
  
3. Daniel Barringer thought the crater in Arizona was:
  - a. too small to be an impact crater.
  - b. the first impact crater ever created.
  - c. an impact crater.
  - d. created by a volcano.
  
4. How long did it take until scientists agreed with Barringer?
  - a. About 20 years
  - b. About 40 years
  - c. About 60 years
  - d. About 80 years
  
5. What kind of crater is the Barringer Crater?
  - a. A bowl impact crater
  - b. A shallow impact crater
  - c. A complex impact crater
  - d. A simple impact crater
  
6. It is thought that impact craters are created on the Earth:
  - a. only when it collides with another planet.
  - b. every 65 million years.
  - c. two or three times every million years.
  - d. only when the Earth collides with the moon.

## SUMMARY AND LISTENING PRACTICE

① 07 

*Read the paragraph and fill in as many blanks as you can. Then listen to the recording and fill in the rest of the blanks.*

The large craters you can see on the \_\_\_\_\_ are caused by objects such as comets, asteroids and meteorites \_\_\_\_\_ into it at high \_\_\_\_\_. They are called impact craters. On the Earth and on Mars, \_\_\_\_\_ has mostly worn these craters away or buried them. The largest known impact crater on the Earth is the Chicxulub Crater in \_\_\_\_\_. Many scientists believe that the Pacific Ocean is a huge impact crater. It is thought that impact craters are only likely to occur two or three times every \_\_\_\_\_ years. However, there are scientists watching the skies for anything that might \_\_\_\_\_ the Earth.

## STRUCTURE AND WRITTEN EXPRESSION

*Complete the sentences using the most appropriate words or phrases. You may refer to the main text to choose the best option.*

1. Through a telescope, you can \_\_\_\_\_ see the moon's many craters.  
a. clarify   b. clarity   c. clear   d. clearly
2. Many impact craters on the Earth have \_\_\_\_\_ because of erosion.  
a. ejected   b. disappeared   c. remained   d. been created
3. Daniel Barringer \_\_\_\_\_ that there were impact craters on the Earth.  
a. denied   b. agreed   c. imagined   d. suggested
4. It was not \_\_\_\_\_ the 1960s that Barringer's idea was accepted.  
a. by   b. until   c. since   d. for
5. The object that created the Barringer Crater \_\_\_\_\_ after it hit the Earth.  
a. was vaporizing   b. vaporized   c. vaporizes   d. had vaporized
6. When an object hits a planet, debris \_\_\_\_\_ into the atmosphere.  
a. is released   b. has released   c. releases   d. is releasing