

# Exhibit J

**HOLT  
SCIENCE &  
TECHNOLOGY**

# **Cells, Heredity, and Classification**

**ANNOTATED TEACHER'S EDITION**

**HOLT, RINEHART AND WINSTON**

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Generators

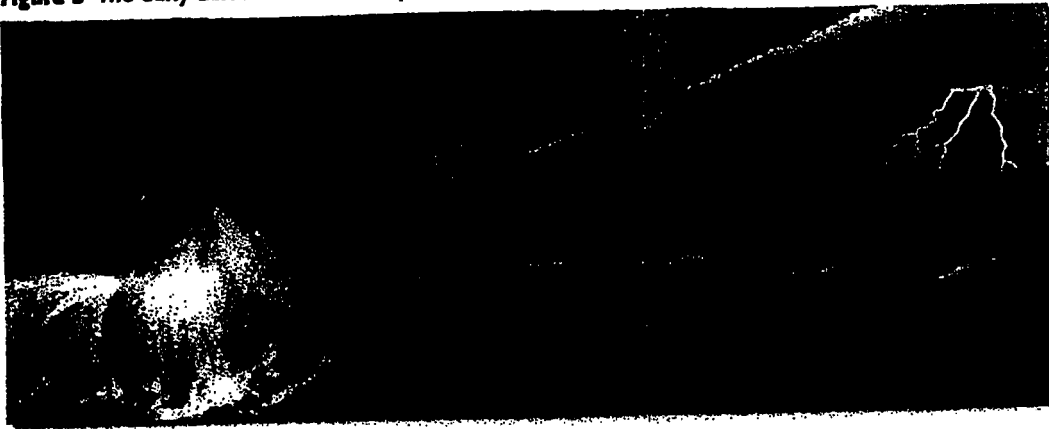
# Inside the Restless Earth

HOLT, RINEHART AND WINSTON

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**The Early Earth** Scientists hypothesize that life began when conditions were quite different from Earth's current environment. These conditions included an atmosphere that lacked oxygen but was rich in other gases, such as carbon monoxide, carbon dioxide, hydrogen, and nitrogen. Also, the early Earth, as illustrated in **Figure 8**, was a place of great turmoil. Meteorites crashed into the Earth's surface. Violent thunderstorms and volcanic eruptions were constant on the young planet. Intense radiation, including ultraviolet radiation from the sun, bombarded Earth's surface.

**Figure 8** The early Earth was a violent place.



**How Did Life Begin?** Scientists hypothesize that under these conditions, life developed from nonliving matter. In other words, life started from the chemicals that already existed in the environment. These chemicals included water, clay, dissolved minerals in the oceans, and the gases present in the atmosphere. The energy present in the early Earth caused these chemicals to react with one another, forming the complex molecules that made life possible.

Some scientists further hypothesize that for millions of years these small, complex molecules floated in the ancient oceans and joined together to form larger molecules. These larger molecules combined into more-complicated structures. As time passed, complicated structures developed into cell-like structures that eventually became the first true cells, called prokaryotes. *Prokaryotes* are cells that lack a nucleus. Early prokaryotic cells, like the one shown in **Figure 9**, were *anaerobic*, which means they did not require oxygen to survive. Many varieties of anaerobic organisms still live on Earth today. Organisms that need oxygen could not have survived on early Earth because there was no free oxygen in the atmosphere.



**Figure 9** Fossilized prokaryotes (such as the circular structure in the photograph) suggest that life first appeared on Earth more than 3.5 billion years ago.

## 2 Teach

### ACTIVITY

**Using Maps** Have students locate the three earthquake zones on a world map. One zone extends nearly the way around the edge of the Pacific Ocean. A second zone is located near the Mediterranean Sea and extends across Asia into India. The third zone extends through Iceland and the middle of the Atlantic Ocean. Sheltered English

### GUIDED PRACTICE

**Concept Mapping** Have students construct a concept map that shows how life on Earth developed from nonliving matter. They should base their map on the information presented in the last two paragraphs of the text. The primary subject heading should refer to the chemicals that already exist in the environment. The final part of the concept map should identify prokaryotes as the first life-forms to appear on Earth.

### USING THE FIGURES

Tell students that fossils indicate how the Earth has evolved. Ask them to think scientists could identify fossils if they found a fossil, such as the one shown in **Figure 9**, high above sea level. (The area was once covered by water.)

## CONNECT TO EARTH SCIENCE

Have students research mountain ranges that formed during the different geologic eras and locate them on a world map. Paleozoic era: Caledonian Mountains of Scandinavia, Acadian Mountains of New York, Appalachian Mountains of North America, and the Ural Mountains of

Russia; Mesozoic era: Palisades Mountains of New Jersey and the Rocky Mountains of North America; Cenozoic era: Andes Mountains of South America, Alps of Central Europe, and the Himalayas of Central Asia.

# Astronomy

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to Zach about it and he told me Mr. Resnikater hurt him and I said you didn't do it and he told me his parents blew it so somewhat out of proportion.

- He was not broadcasting his bible. He had a messy desk with many papers on it. I would have never noticed the bible until after Mr. St. Mom said something.

T. Ullman

FURTHER AFFIANT SAYETH NAUGH

The foregoing affidavit was sworn to and acknowledged before me this April 16, 2010, by \_\_\_\_\_, who is personally known by me or who provided satisfactory identification and who did swear to the truthfulness of the above.

R. Kelly Hamilton  
Notary Public



R. KELLY HAMILTON, ATTORNEY AT LAW  
Notary Public  
In and for the State of Ohio  
My Commission Has No Expiration Date  
Section 147.03 R.C.

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