

BRINGING BACK THE DEAD

- **HAVE YOU EVER SEEN THE MOVIE *JURASSIC PARK*? SCIENTISTS IN THIS MOVIE USE GENETIC ENGINEERING TECHNIQUES TO RECREATE EXTINCT DINOSAURS. WITH THE ADVANCES IN GENETIC TECHNOLOGY TODAY, WE ARE NOW A STEP CLOSER TO REALIZING THE PREMISE OF THE MOVIE. THIS LESSON INTRODUCES THE DEVELOPMENT OF GENETIC ENGINEERING TECHNIQUES TO RESURRECT EXTINCT ANIMALS.**

In addition, you will learn:

- how to predict the content of the article from the title
- how to summarize the main ideas
- what compound adjectives and word parts are
- how to use 5w1h principles to conduct an interview
- how to write a simple newspaper article
- additional knowledge about DNA

Before You Read

Discuss the following questions in a small group:

1. Are you in favor of bringing back animal species that are extinct? Why or why not? Please give at least three reasons.
2. How do you feel about recreating the Neanderthals?
3. What might be the consequences, both positive and negative, of resurrecting extinct animals?

Reading Skills, Predicting from the title—please carefully read the following explanation.

The title of an article usually gives readers an overview of the content of the text. We can thus use it to predict the main ideas of an article, giving our imaginations some time to predict the content before we start to read. This is a common technique used for reading the newspaper since we can quickly learn what the major stories are by simply looking at the headlines.

For example, the key words of the title “When a parent is bipolar, kids are at risk too” are “parents,” “bipolar” and “kids.” When you see the words parents and kids, you might guess that the article will be about family issues. The word bipolar means a psychiatric disorder, so you can predict that the issue is related to mental health and the article might be about how bipolar disorder is passed down to the children from their parents.

Work in small groups. Read the following headlines and predict what the articles might be about. If possible, give your own opinions on the stories.

1. Heart Disease on the Rise in India
2. Seeing Color in Sounds Has Genetic Link
3. Feeling Lonely? Genes Might Be at Fault
4. Suicidal Behavior May Run in Families
5. Florida Couple Clones Beloved Dog for \$155,000

Read the title of the article below and write down five words that you think might be used in the story. Share the words with your group, and work together to predict what information the article will present.

Reading

Bringing Back the Prehistoric Dead

(April, 12, 2009) – Have you ever seen the movie *Jurassic Park*? The movie is about recreating dinosaurs using dinosaur DNA contained in a well-preserved mosquito trapped in amber. The idea of the movie may sound crazy, but a team of scientists at Penn State University, USA, is bringing us **one step closer** to realizing this fantasy of bringing extinct species **back to life**.

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This groundbreaking achievement is being made possible by using a genome-wide sequencing technique to analyze the DNA of woolly mammoths found in the Siberian permafrost that have been buried for 20,000 and 60,000 years. The woolly mammoth is a prehistoric species of elephant which disappeared at the end of the Pleistocene epoch, the period of time from 1.8 million to 10,000 years ago.

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Scientists have used mammoth hairs found on two frozen mammoth mummies to analyze the DNA. The hair shaft of the mammoth encases the DNA like a biological plastic, so the genetic information is less prone to environmental damage and possible bacterial and viral contamination. Before this, scientists usually used bone tissue as the source of DNA, but this is more susceptible to contamination, and is thus not an ideal source for complete, undamaged DNA information.

Most of the genetic code of the woolly mammoth has now been uncovered, which provides the basis for recreating this already extinct creature. “This really is the first time that we have been able to study an extinct animal in the same detail as the ones living in our own time,” said Stephan Schuster, a Penn State University biochemistry professor and co-author of the research.

Scientists have recorded the sequence of more than three billion DNA building blocks of the mammoth, enough to allow them to glimpse into the timing of its evolution and now they are searching the mammoth’s genome for clues about its extinction. Some experts believe that the low genetic diversity of the mammoth population may be one of the reasons.

“By deciphering this genome, we could, in theory, generate data that one day may help other researchers bring the woolly mammoth back to life by inserting the uniquely mammoth DNA sequences into the genome of the modern-day elephant,” Schuster said. “It could be done,” he added. “The question is, just because we might be able to do it one day, *should* we do it?”

Some experts are excited about the idea of piecing together clues in the DNA of extinct animals and their modern relatives in the hope of resurrecting long dead species. However, some fear that we might disturb the entire ecosystem by bringing them back to life, arguing that these already-extinct creatures have had their chance at survival, and Mother Nature has chosen to eliminate them. “These animals must be extinct for a reason, and that should be enough for us to leave them undisturbed,” said one of the lab technicians working in a related research team.

With the rapidly-advancing technology today, genetic engineering techniques will continue to develop, whether people like it or not. Maybe one day, instead of going to the zoo to see lions, elephants and giraffes, we will be going to a dinosaur theme park, just like the one in “Jurassic Park.” Let’s just hope that we won’t share the same fate as the main characters in that movie.

After You Read

I *Reading Comprehension*—read the following statements and decide if they are true (T) or false (F), according to the article, or unknown (U), not mention in the article.

- _____ 1. Project scientists have sequenced more than 9 billion DNA building blocks of the mammoth.
- _____ 2. Scientists could use DNA sequencing to re-create an extinct creature.
- _____ 3. The DNA found in the mammoth hairs is well preserved.
- _____ 4. After the mammoth, scientists plan to resurrect Neanderthals.
- _____ 5. A modern elephant can act as a surrogate mother for a mammoth baby.

II *Summarizing*—use the following steps to summarize the main point of each paragraph in one sentence.

Step 1: Read the paragraph carefully and decide which information is important. Underline the important concepts.

Step 2: Write one sentence that includes all of these important ideas.

Step 3: Try to shorten that sentence. Use the fewest words possible to describe the main points of the paragraph.

	Summary
Paragraph 1	Scientists are now one step closer to recreating extinct animals.
Paragraph 2	
Paragraph 3	
Paragraph 4	
Paragraph 5	
Paragraph 6	
Paragraph 7	
Paragraph 8	

Vocabulary Comprehension

ESP Vocabulary

This vocabulary is commonly used in the field of bio- and medical science.

creature	<i>n</i>	any living things except plants
ecosystem	<i>n</i>	all the plants and animals in a particular area, considered as a system with parts that depend on one another
extinct	<i>adj</i>	when an animal, plant or language no longer exists
genetic code	<i>n</i>	the information that is contained DNA
genome	<i>n</i>	the total amount of genetic information in the chromosomes of a living thing, including genes and DNA
hair shaft	<i>n</i>	the part of a hair projecting beyond the skin
mammoth	<i>n</i>	a hairy animal very similar to an elephant that became extinct about 10,000 years ago
mummy	<i>n</i>	a dead body that has been treated with special oils and wrapped in long narrow pieces of cloth to prevent it from decaying, especially in ancient Egypt
permafrost	<i>n</i>	ground that stays permanently frozen, for example in the polar regions
species	<i>n</i>	a plant or animal group whose members all have similar general features and are able to produce young plants or animals together
sequencing	<i>n</i>	the method of decoding the genetic code
tissue	<i>n</i>	a substance that is made of animal and plant cells

General Vocabulary

This vocabulary is used for general purposes.

achievement	<i>n</i>	a particular thing that you have achieved
contamination	<i>n</i>	when something is polluted or becomes impure
decipher	<i>v</i>	find out the meaning of something coded, decode
diversity	<i>n</i>	the fact that very different people or things exist within a group or place
encase	<i>v</i>	to completely cover or enclose something

factor	<i>n</i>	one of the things that influence whether an event happens or the way that it happens
groundbreaking	<i>adj</i>	using new methods, or achieving new results
insert	<i>v</i>	to put something inside something
Pleistocene	<i>n</i>	a period of time beginning about two million years ago and ending 10,000 years ago
population	<i>n</i>	the number of people who live in a particular area

Exercise

I *In order to expand your vocabulary through association of ideas, work in small groups. The first person picks a word from the ESP Focus section and says it to the group. The second person continues by saying a word that is associated with the first word. The game ends when a student cannot come up with a word to keep the sequence going. NOTE: only the first word needs to be from the vocabulary introduced above.*

For example,

extinct ⇔ mammoth ⇔ ice age...

II *Each person should take a turn making a sentence with a Vocabulary word. After saying his/her sentence, the first student picks a different word for the second student, the second student picks a different word for the third student, and so on.*

For example,

Student 1: Decifer. I like to **decifer** secret codes. Extinct

Student 2: The dinosaurs became **extinct** 65 million years ago. Mammoth

Student 3: I went to see the **mammoth** exhibition in the science museum yesterday, and I liked it. Species

And so forth...

Phrases

Here are some phrases used in the article that are useful in speaking and/or writing.

Work in pairs to discuss the meaning of these phrases, and then practice the dialogs that follow.

one step closer to

A: Detective, what have you discovered from questioning the suspects?

B: We've got some hard evidence. I think we are **one step closer to** the truth.

to bring ... back to life

A: Have you read today's newspaper? Some scientists are hoping to **bring** extinct animals **back to life**.

B: Wow, that would be cool!

less prone to

A: I feel so depressed lately.

B: Cheer up! If you look on the bright side of everything, you will be **less prone to** depression.

to piece ... together

A: Here are the lab findings and some photos from the crime scene.

B: Let's **piece** them **together**. Maybe they will bring us one step closer to the truth

Language Focus

Compound Words

The word “well-preserved” in paragraph 1 is a hyphenated word—two words with a hyphen between them, and in the text it is used as an adjective to describe the state of a mosquito. This kind of structure is called a **compound word** and is often used as an adjective. Compound adjectives can have a few different forms:

Type of compound adjective	Examples: definitions
1. adj/adv/noun + past participle	cold-blooded: He was a cold-blooded serial killer.
2. adj/adv/noun + present participle	good-looking: Brad Pitt is a good-looking movie star.
3. noun + adj	world-famous: Beckham is a world-famous footballer.

4. adj + noun	last-minute: Last-minute plane tickets are cheaper.
5. number + noun	forty-mile: It is a forty-mile ride to my office.

Exercise

I Find a partner. Together, find the compound adjectives in the article and write them down with their definitions in the chart on page 8-9 next to the type that they match.

II Work in pairs. Think about two more compound adjectives for each type from the chart.

Word Parts

English words are formed from many parts. For example, the word **prehistoric** is formed from the prefix “pre” and the word root “historic.” “Pre” means before, so **prehistoric** is an adjective describing things or people existing at a time before history, or before information was written down. Knowing the meaning of these parts and how a word is formed with them can help you identify the meaning of a new word and remember new words more easily.

Prefix	Def.		Word root	Def.		Word	Def.
pre	before	+	historic	to do with the past	=	prehistoric	of the time before history
re	again	+	create	to make something	=	recreate	to make again
un	opposite of	+	cover	put something over something else	=	uncover	take off the cover
co	together	+	author	writer of a smething etc	=	coauthor	smone who writes a book with smone else
de	the opposite	+	cipher	a secret code	=	decipher	find out the meaning of a code

Exercise

Work in small groups and brainstorm as many words as possible for each of the categories in the chart.

prefix	word root	word
pre		
inter		
re		
un		
co		
de		

Can you think of any other prefixes and some examples of how they are used?

Tasks**Speaking: 5W1H Questions**

Interviewing is a common way for medical professionals to get information from patients, the general public or research subjects. Conducting an oral interview requires careful preparation of the questions to be asked. In this section, you are going to learn a basic technique for forming effective interview questions.

The 5W1H Principles

The 5W1H principles involve forming questions that begin with *Who*, *What*, *Where*, *When*, *Why*, and *How*. Using the 5W1H principles can help you identify the basic information you **need to** obtain from an interviewee.

Exercise**Five-minute Interview with a Mad Scientist**

I *Work in pairs; one plays a newspaper reporter who is going to interview a scientist about his/her latest project, which involves bringing back a dead species. The reporter should take notes on what the scientist says in the interview. During an interview, try to use questions starting with the 5W1H words to help you gather the necessary information and to learn more about what your audience wants to know. For example, the reporter may ask the scientist the following questions:*

1. What extinct animal are you trying to resurrect?
2. When did you start the project?
3. How will you recreate the animals?
4. Where did you collect the data for your research?
5. Why did you pick this research topic?
6. Who is opposed to this research, and why?

II *First, write your interview questions with your partner:*

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

III *Now conduct the interview based on your interview questions.*

Reporter: Good morning, Dr. _____. I am _____ from _____. It's my pleasure to have the opportunity to interview you about your latest project. Can you first tell us _____

Scientist: Yes, _____.

Reporter: Can you please tell us the importance of your research?

Scientist: Yes. My research is important because _____.

Reporter: _____

Scientist: _____

Writing: a News Article

In this section, we are going to learn how to structure a simple news article. The following information is about a genetic finding. Please use A-G statements to make a clear and organized news article. In other words, read the statements and then arrange them into an appropriate sequence. After organizing the statements, read the article again and choose a good title for the reorganized article.

- A. The chief executive officer of Decode, Kari Stefansson, said that they could make this discovery because they were in the unique position of being able to distinguish what is inherited from the mother from what is inherited from the father.
- B. A new type-2 diabetes gene has been discovered by researchers. This newly discovered gene is a single nucleotide polymorphism or SNP—a single-letter change in the genetic code.
- C. When a new gene is inherited from the mother, it protects the child from the disease. However, if inherited from the father, there is a risk of disease. Three other diabetes genes are varied in their effects, but less so, depending on which parent the gene comes from, researchers reported in the journal *Nature*.
- D. Five disease-related genes found by a team at Iceland's Decode Genetics Inc take effect if inherited from a certain parent.
- E. The finding showed the risk of breast cancer was raised when inherited from the father, and the gene from the mother was able to be protective.
- F. The type-2 diabetes gene can have an impact that is not only large, but also unusual: when from the father, the risk of diabetes is 30 percent higher than those who inherit the non diabetes-linked version, researchers wrote.
- G. Basal-cell carcinoma is a slow-growing skin cancer which is far more dangerous when inherited from the father.

_____ (the title)

Paragraph 1: _____ Paragraph 5: _____

Paragraph 2: _____ Paragraph 6: _____

Paragraph 3: _____ Paragraph 7: _____

Paragraph 4: _____ Paragraph 8: _____

(Source: China Post, 19, December, 2009. <http://www.chinapost.com.tw/health/2009/12/19/237223/Genetic%2Dgift.htm>)

Further Reading: Inside the Technology

Here is more information about the latest developments in genetic engineering!

Website of the Day

Here is a useful website where you can learn the latest information on the development of important technology in the field of genetics.

CNN news articles on genetics

<http://topics.cnn.com/topics/Genetics>

Facts & Myths

Q: Can we resurrect dinosaurs like in the movie “Jurassic Park” ?

No, because DNA over 1 million years old is damaged beyond recognition and repair.

Extra Info: What is DNA?

We all know that elephants only give birth to little elephants, giraffes to giraffes, dogs to dogs and so on for every type of living creature. But why is this so?

The answer lies in a molecule called deoxyribonucleic acid (DNA), which contains the biological instructions that make each species unique. DNA, along with the instructions it contains, is passed from adult organisms to their offspring during reproduction.

DNA is found inside a special area of the cell called the nucleus. Because the cell is very small, and because organisms have many DNA molecules per cell, each DNA molecule must be tightly packaged. This packaged form of the DNA is called a chromosome. Researchers refer to DNA found in the cell’s nucleus as nuclear DNA. An organism’s complete set of nuclear DNA is called its genome.

DNA is made of chemical building blocks called nucleotides. The four types of nitrogen bases found in nucleotides are: adenine (A), thymine (T), guanine (G) and cytosine (C). The order, or sequence, of these bases determines what biological instructions are contained in a strand of DNA. For example, the sequence ATCGTT might instruct for blue eyes, while ATCGCT might instruct for brown.

Each DNA sequence that contains instructions to make a protein is known as a gene. The size of a gene may vary greatly, ranging from about 1,000 bases to 1 million bases in humans.

The complete DNA instruction book, or genome, for a human contains about 3 billion bases and about 20,000 genes on 23 pairs of chromosomes.

Source: National Human Genome Research Institute, USA. (<http://www.genome.gov/>)



End-of-Lesson Quiz

Test yourself on how much you understand and remember from this lesson!

Matching

Match the Vocabulary on the left with the definitions on the right.

- | | |
|--------------------------|--|
| _____ 1. tissue | A. the substance that is made of animal and plant cells |
| _____ 2. factor | B. a particular thing that you have achieved |
| _____ 3. achievement | C. when something is polluted or becomes impure |
| _____ 4. genetic code | D. to figure out the meaning of a code |
| _____ 5. contamination | E. very different people or things existing within a group or place |
| _____ 6. extinct | F. to completely cover or enclose something |
| _____ 7. encase | G. one of the things that influence whether an event happens or the way that it happens |
| _____ 8. decipher | H. using new methods, or achieving new results |
| _____ 9. ecosystem | I. to put something inside something |
| _____ 10. hair shaft | J. the number of people who live in a particular area |
| _____ 11. mammoth | K. any living thing except plants |
| _____ 12. species | L. all the plants and animals in a particular area, considered as a system with parts that depend on one another |
| _____ 13. diversity | M. an animal, plant, or language that no longer exists |
| _____ 14. groundbreaking | N. the arrangement of genes that makes an individual develop in a particular way |

- ___ 15. mummy
- ___ 16. insert
- ___ 17. permafrost
- ___ 18. population
- ___ 19. genome
- ___ 20. creature
- O. the total amount of genetic information in the chromosomes of a living thing, including its genes and DNA
- P. the part of a hair projecting beyond the skin
- Q. an animal very similar to an elephant, except it has long hair and is now extinct
- R. a dead body that has been treated with special oils and wrapped in long narrow pieces of cloth to prevent it from decaying, especially in ancient Egypt
- S. ground that stays permanently frozen, for example in the polar regions
- T. a plant or animal group whose members all have similar general features and are able to reproduce together