

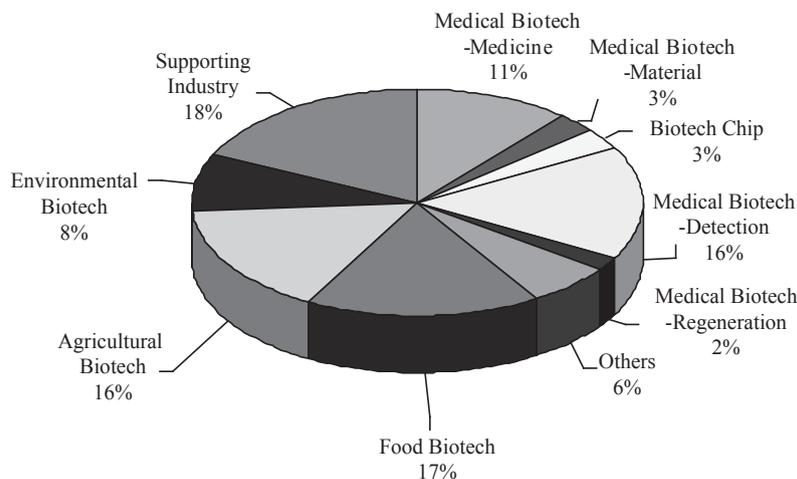
# Lesson 1

## THE BIOTECHNOLOGY INDUSTRY IN TAIWAN I

• IN ORDER TO IMPROVE HUMAN HEALTH AND THE ENVIRONMENT, SCIENTISTS UTILIZE LIVING ORGANISMS TO CREATE BIOTECHNOLOGY PRODUCTS. IN THIS LESSON THE AUTHOR BRIEFLY INTRODUCES THE DEVELOPMENT AND HISTORY OF BIOTECHNOLOGY.

### Before You Read

**I** The pie chart below shows different sectors of the biotechnology industry in Taiwan for the years 1997 to 2003. Work in groups of four to five. Look at the chart and discuss the answers to the following questions. After completing the questions, above, with your group members discuss which bio-tech sectors you are most interested in? Why?



Questions	Answer
1. How many categories of biotechnology (bio-tech) were developing in Taiwan during this period?	
2. What were the top three bio-tech sectors in Taiwan?	
3. Have you heard of any of the sectors in the pie chart? Which ones?	
4. Using your background knowledge, which sector in the chart do you think saw the most dramatic growth from 1997 to 2003?	

**II** The Biotechnology Industry Organization (BIO) was established in 1993 and represents over 1,200 companies, academic institutions and research centers around the world. BIO is involved in health care, agricultural, industrial and environmental biotechnology products. BIO's Food and Agriculture section has listed some of the benefits of developing Bio-Agriculture. *Please match the four benefits listed below with the appropriate title (A, B, C or D).*

- |   |                                     |
|---|-------------------------------------|
| 1. Gross domestic product (GDP) can grow by 2%. | A Reduce Soil Erosion               |
| 2. Plants are resistant to pests and diseases.  | B. Reduce Pesticide Applications    |
| 3. Output of crops increases.                   | C. Higher Yields and Higher Incomes |
| 4. Loss of top soil is reduced.                 | D. Benefits to Developing Countries |

## Reading

### How I View the Promotion of the **Biotechnology** Industry I

Scientific research was born out of mankind's curiosity about natural phenomena. The findings based on natural phenomena **facilitate** technological developments, which in turn, improve our quality of life. It was not until 220 years ago, when the industrial **revolution** started, that technological development began to accelerate. More recently, a series of **5** technological studies, including chemistry, medicine, computers, and biotechnology, have led to a new industrial revolution. This revolution has greatly changed our lives, and thus the structure of our society.

Recent history has **highlighted** the development of hi-tech industries which have supported and promoted the development of the world's economy through **innovative** discoveries. **10** These innovative discoveries play a crucial role in a country's strength, where forward-looking research and technology are considered a key indicator of competitiveness.

The advance of modern science and technology in Taiwan began about thirty years ago, when the economy and political system began developing stably. Students who studied abroad were then **enticed** to return. More than a decade ago, we were still in the early stages, **15** learning by imitating and building the foundations of a research environment. However, in recent years, our research environment has matured.

The rise of biotechnology was triggered by the new concepts of molecular biology. With the development of genetic engineering and its applications for human needs, environmental

protection, and medicine, it is evident that biotechnology has numerous applications in various fields. This **versatility** has almost unlimited potential, and has resulted in the most popular hi-tech industry around the world. Recently, with the rapid growth of **genomics** and proteomics, biotechnology has stepped into the post-genomic era. The genes of many organisms on Earth have been sequenced and **annotated** in DNA databases, which are continually growing and **accumulating** more information. The data they hold can be used to serve the needs of environmental protection, agriculture and medicine.

Due to the rapid growth of biotechnology, the subjects of research have changed from single-cell to multi-cell organisms in the fields of **zoology** and **botany**. In product development, it has expanded from medicine to agriculture, where the research methods have been changing even faster, **evolving** from simple genetic engineering to multidisciplinary integration. Biotechnology today has diversified into Bio-X, such as Bio-Informatics, Bio-Engineering, Bio-Remediation, Bio-Material, Bio-Medicine, and Bio-Agriculture.

In order to successfully develop biotechnology, hi-tech research should be based on innovation and aimed at building an industry of its own. The development of biotechnology can quickly bring about many new technologies and create huge profits, so it has become an industry that many countries are eager to get involved in. Because of the patent limitations of different countries, as well as the variety and experience of each country's industrial environment, many countries have become aware of their natural constraints when drawing up a strategy, and thus have had to specialize. Each country must thus choose an important area toward which they may push their biotechnology industry. Therefore, in order to plan an effective national strategy, one must consider all the related factors.

Taiwan began promoting biotechnology industries in 1980, but the government launched the "Promotion Program for the Biotechnology Industry" in 1995 as the standard for promoting such industries. Later, in 2002, in the Planning and Implementation of the Challenge 2008: National Development Plan, biotechnology was one of the two trillion-dollar star industries. It is also considered a top priority in Taiwan's Economic Development Visions for 2015.

The related agencies in the Taiwanese government are **mandated** to develop their policies in support of innovative research, major construction, environmental set up, university-industry collaboration, and university-industry societies. Each agency is working on projects related to their unique specialty, and through cross-agency cooperation, hopefully, innovative technology, technology transfer and value addition can be successfully integrated **vertically**, leading to an international biotechnology industry being established.

Excerpt based on "How I See the Promotion of the Biotechnology Industry," published by *Banyan Research Express@NCKU* in September, 2007

## After You Read

According to the reading, mark the following statements as either *True (T)* or *False (F)*.

1. \_\_\_\_ Mankind's curiosity about natural phenomena prompts scientific research and improves our quality of life.
2. \_\_\_\_ Technological development accelerated before the industrial revolution 220 years ago.
3. \_\_\_\_ The innovative discoveries in hi-tech industries are a crucial indicator of a country's economic growth and competitiveness.
4. \_\_\_\_ The advance of modern science and technology in Taiwan is still in its early stages.
5. \_\_\_\_ Biotechnology has become the most popular hi-tech industry around the world because of its versatility in applications for human needs, environmental protection, and medicines.
6. \_\_\_\_ Biotechnological research in zoology and botany began with multi-cell subjects.
7. \_\_\_\_ Biotechnology has grown rapidly in the past few decades in terms of its range of interest and the related product development. However, in contrast, the research methods in this area have been advancing relatively slowly.
8. \_\_\_\_ Biotechnology has become an industry that many countries are eager to get involved with because it can lead to a wide range of new technologies with the potential to yield huge profits.
9. \_\_\_\_ When establishing strategies to push biotechnological development, most countries have specialized in a certain area due to their patent limitations and industrial environments.
10. \_\_\_\_ The Taiwanese government launched the "Promotion Program for the Biotechnology Industry" when it began promoting biotechnology in 1980.

## Vocabulary Comprehension

### General Vocabulary

*This vocabulary is used for general purposes.*

facilitate	<i>v</i>	to make it possible or easier for something to happen
revolution	<i>n</i>	a sudden or major change, especially in ideas or methods
highlight	<i>v</i>	to describe something in a way that makes people notice it and think about it; emphasize
innovative	<i>adj</i>	new, original, and advanced
	<i>n</i>	innovation

# 3

## LESSON 1: THE BIOTECHNOLOGY INDUSTRY IN TAIWAN I

versatility	<i>n</i>	versatile (adj) able to be used in many different ways
evolve	<i>v</i>	when a type of plant or animal evolves, its physical form changes over a long period of time
contemporary	<i>adj</i>	modern, or relating to the present time
accumulate	<i>v</i>	to get more and more of something over a period of time
vertically	<i>adv</i>	standing, pointing or moving straight up. opposite: horizontally
	<i>adj</i>	vertical
entice	<i>v</i>	to persuade someone to do something, especially by offering them an advantage or reward
trigger	<i>v</i>	to make something happen
unfathomable	<i>adj</i>	impossible to explain or understand
annotate	<i>v</i>	to put notes in a piece of writing in order to explain parts of it
remediation	<i>n</i>	the process of improving a situation or of correcting a problem

### ESP Vocabulary

*This vocabulary is commonly used in the fields of engineering and industry.*

biotechnology	<i>n</i>	the use of bacteria, plant and animal cells for industrial or scientific purposes, for example to make drugs or chemicals
gene	<i>n</i>	a pattern of chemicals within a cell that carries information about the qualities passed to a living thing from the parents
		genetic (adj)
organism	<i>n</i>	a living thing such as a person, animal or plant; term usually used for extremely small living things
genomics	<i>n</i>	the study of the genomes of organisms
proteomics	<i>n</i>	the large-scale study of proteins, particularly their structures and functions
zoology	<i>n</i>	the scientific study of animals
botany	<i>n</i>	the scientific study of plants
mandate	<i>v</i>	to give someone the authority to do something



### Exercise

Choose the appropriate words from the general and ESP vocabulary to replace the bold word or phrase. Change the form if necessary.

1. \_\_\_\_\_ Taiwan began to develop biotechnology about thirty years ago. Biotechnology was a(n) **new and different idea** field for developing bio-technology products.
2. \_\_\_\_\_ The researcher could **collect or increase gradually** experience to cope with the problems of developing biotechnology at that time.
3. \_\_\_\_\_ The government **give authority to the related** organizations to develop their own research.
4. \_\_\_\_\_ Biotechnology in Taiwan has stepped into the post-genomic era to establish a DNA database from sequencing the genes of many **single living thing plants, animals or other living things**.
5. \_\_\_\_\_ Bio-Informatics, Bio-Engineering, Bio-Remediation, Bio-Material, Bio-Medicine, and Bio-Agriculture are part of a **sudden and great change** in many industries.
6. \_\_\_\_\_ The government provides many benefits to **attract someone by offering something pleasant** company investment in biotechnology.
7. \_\_\_\_\_ The development of biotechnology in Taiwan has **to change or develop gradually** to become more sophisticated in recent years.
8. \_\_\_\_\_ Biotechnology was **to cause something to start** by the new concepts of molecular biology.
9. \_\_\_\_\_ Biotechnology has developed gradually through these **improvements**.
10. \_\_\_\_\_ When we develop biotechnology, environmental issues should be **emphasize**.
11. \_\_\_\_\_ Biomedical development has provided some solutions to resolve some **indescribable** diseases.
12. \_\_\_\_\_ The development of biotechnology is **in many different ways**.

## Language Focus

### Collocation

In this section, we will take a look at the difference between **evidence** and **proof**. Some examples from COCA show the frequent co-occurring use of **evidence** and **proof**.

**evidence**

1. New **evidence suggests** that humans and Neanderthals are very similar but probably didn't interbreed.
2. A great deal of **evidence indicates** that the need for secure attachment never disappears.
3. No scientific **evidence supports** this notion.

The collocation of **evidence** with verbs such as **suggest**, **indicate** and **support**, is frequently seen in academic writing.

**proof**

1. The **proof is** in the pudding.
2. The **proof of** purchase for "A Million Little Pieces" **is**...
3. The burden of **proof lies** with those seeking repatriation.

COCA has shown that **proof** usually appears with the verb **to be + of + noun**, or the verb **lie + with + noun**. It does not occur very often in academic writing. Therefore, when you want to provide information to support something in your academic writing, **evidence** is better than **proof**.

When we want to describe the quality or degree of **evidence** or **proof**, we use an adjective. Go to the **JTW** website and search the collocations for **ADJ + evidence** and **ADJ + proof**.

**Step-by-Step Instructions**

1. Go to **JTW**. ([//www.just-the-word.com/](http://www.just-the-word.com/))
2. Type **evidence** and choose **combinations**.
3. Look for the combination **ADJ N\***.
4. The results are listed.
5. Write down five combinations below.

Then, choose the **search box** at the top of the webpage. Repeat the same procedure to look at **proof**. (Please note that this corpus system is constantly being updated, and the actual page or data that you see may be different when you access it.)

adjective

noun

clear

\_\_\_\_\_

\_\_\_\_\_

evidence

adjective

noun

conclusive

\_\_\_\_\_

\_\_\_\_\_

proof



### Exercise

After reviewing the use of **evidence** and **proof**, you are going to make your own sentences.

1. The study \_\_\_\_\_ (V+ADJ+evidence).
2. This is the \_\_\_\_\_ (ADJ+proof) of purchase for books.
3. The \_\_\_\_\_ (ADJ+evidence+V) the differences between two methodologies.
4. This is \_\_\_\_\_ (ADJ+ proof) that they broke into the old lady's house.

### Grammar—Present Perfect and Simple Past

For most students, there is some confusion when it comes to choosing between simple past and present perfect in academic writing. The general idea is that we use simple past to talk about a completed action or an event that occurred in the past. However, we use the present perfect to talk about experiences and changes that happened over a period of time. Moreover, when accomplishments are achieved or an action is lasting and uncompleted, we also use the present perfect.

When the situation has not ended—present perfect

*I have lived in America for a year.* (I am still living in America).

When the situation has ended—past simple

*I lived in Japan for a year.* (But now I live in America)

When there is a time expression for a point of time in the past and up until the present—present perfect

*I have seen many good movies this year.*

When there is a time expression for a point of time in the past—past simple.

*I saw a good movie last night.*



### Exercise

**I** Please use the words provided in parentheses with past simple or present perfect to complete the following sentences from the article.

1. The Industrial Revolution \_\_\_\_\_ (change) our lives.
2. Contemporary history \_\_\_\_\_ (highlight) the development of hi-tech industries.
3. The advance of modern science and technology in Taiwan \_\_\_\_\_ (begin) about thirty years ago.
4. In recent years, our research environment \_\_\_\_\_ (mature).
5. Recently, with the rapid growth of genomics and proteomics, biotechnology \_\_\_\_\_ (step) into the post-genomic era.
6. Because of the patent limitations of different countries, as well as the variety and experience of each country's industrial environments, many countries have \_\_\_\_\_ (become) aware of their natural constraints when drawing up a strategy, and thus have had to specialize.
7. Taiwan \_\_\_\_\_ (begin) promoting biotechnology in 1980.
8. The Taiwanese government \_\_\_\_\_ (launch) the "Promotion Program for the Biotechnology Industry" in 1995.

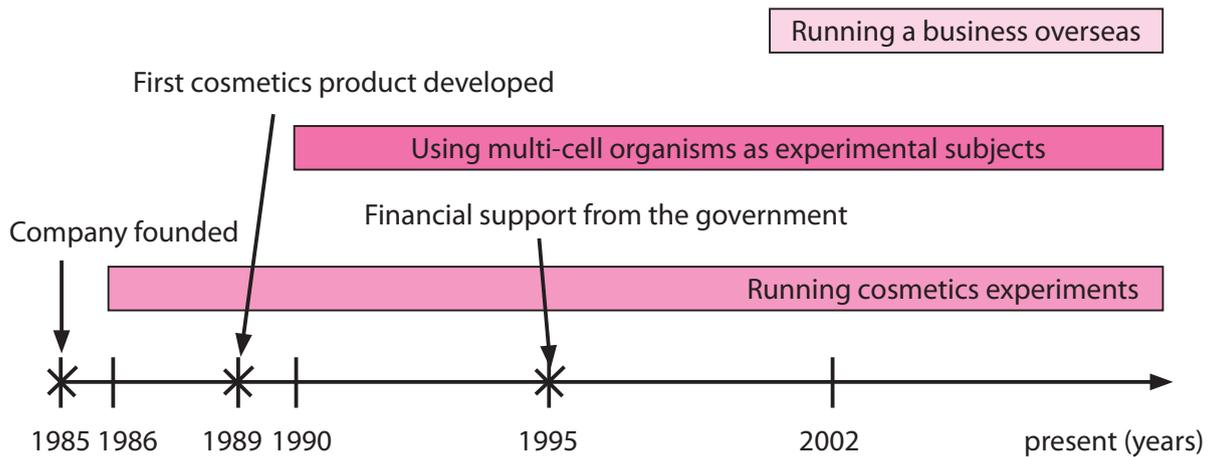
**II** Please use the words provided in parentheses with past simple or present perfect to complete the following sentences.

1. John (manage) \_\_\_\_\_ to meet Joan already. He (try) \_\_\_\_\_ to get in touch with her three times since last Monday. Finally, she (reply) \_\_\_\_\_ this morning.
2. Joseph (wear) \_\_\_\_\_ his new shoes only once since he (buy) \_\_\_\_\_ them. He (wear) \_\_\_\_\_ them to Anna's birthday party.
3. How long (you, live) \_\_\_\_\_ in this apartment?
4. Last night, Marty and I (have) \_\_\_\_\_ some free time, so we (go) \_\_\_\_\_ to see a movie.

5. I (have) \_\_\_\_\_ more and more work to do since I (come) \_\_\_\_\_ to work in this company.

### Task

AMB is a biotechnology company developing cosmetics in Taiwan. It was founded in 1985, and has been running experiments to create cosmetics that are harmless to human skin. It is one of the companies sponsored by the government's "Promotion Program for the Biotechnology Industry." The following chart shows major events at AMB from 1985 to 2009.



Note: X's represent the year in which the event happened, while the bars indicate the period of time that the event lasts.

Please use the information provided in the chart to complete the following table.

Year(s)	Event
	Company founded.
1986~present	
1989	
	Financial support from the government's "Promotion Program for the Biotechnology Industry."
2002~present	

Please use past simple or present perfect to convert the contents of the table into a paragraph. You can begin with "AMB was founded in 1985..."