МИНИСТЕРСТВО ОБРАЗОВАНИЯ И НАУКИ РОССИЙСКОЙ ФЕДЕРАЦИИ

Федеральное государственное автономное образовательное учреждение высшего профессионального образования «ЮЖНЫЙ ФЕДЕРАЛЬНЫЙ УНИВЕРСИТЕТ»

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Учебно-методическое пособие

"The Secret World of Microbes”

Ростов-на-Дону
2013

Учебно-методическое пособие разработано старшим преподавателем кафедры английского языка естественных факультетов С.Ю. Резниковой

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Печатается в соответствии с решением кафедры английского языка естественных факультетов, протокол № 5 от 21 декабря 2012 г.

Пояснительная записка

Учебно-методическое пособие “The Secret World of Microbes” предназначается для студентов 1-2 курсов биологических специальностей университетов. Его целью является формирование иноязычной коммуникативной компетенции в сфере будущей профессиональной деятельности студентов-биологов, что предполагает успешное овладение английским языком как средством их дальнейшего профессионального развития.

Предлагаемое учебно-методическое пособие ориентировано на создание условий для приобретения студентами опыта использования языковых знаний и умений в различных ситуациях общения, связанных с работой в лаборатории; развития творческого подхода к решению профессиональных задач; формирования умений самостоятельной работы; активного использования современных информационных технологий; коллективной познавательной деятельности; самоконтроля и оценки усвоения формируемых навыков и умений.

В пособии вводятся и закрепляются терминологические единицы, характерные для биологических специальностей, развиваются и совершенствуются коммуникативные навыки и стратегии автономного обучения.

Учебно-методическое пособие также содержит приложение, которое включает текстовую основу для прослушивания (script).

Типология используемых в пособии заданий разнообразна и представлена следующими рубриками:

Lead in – включает задания, имеющие своей целью выяснить фоновые знания, мнения, суждения студентов по обсуждаемой тематике.

Reading – предлагает задания на развитие навыков различных видов чтения, извлечение информации, понимание структуры, организации и содержания текста.

Listening – представляет собой аудиозапись монолога профессиональной

направленности и сопровождается заданиями, нацеленными на извлечение конкретной информации, развитие навыков конспектирования, переработки и передачи информации на английском языке.

Focus on language – акцентирует внимание на определенных грамматических аспектах, ключевых словах и словосочетаниях, включает задания на расширение общего и терминологического словарного запаса студентов.

Discuss – предлагает вопросы, позволяющие выявить отношение к прочитанному материалу и соотнести его с собственными знаниями, интересами и опытом.

Get real – предполагает использование умений поиска информации на интернет сайтах и в научно-популярных публикациях в условиях, максимально приближенных к ситуациям реальной учебной и профессиональной деятельности.

Speaking – предлагает задания, направленные на формирование умений диалогического, а также неподготовленного и подготовленного монологического высказывания.

Writing – предлагает различные задания, направленные на развитие умения фиксировать информацию на английском языке с использованием различных форм записи.

Summarizing – имеет своей целью формирование навыков аннотирования научно-популярных русскоязычных текстов на английском языке.

In the Realm of Science – включает дополнительный справочный материал, отражающий специфику естественнонаучных специальностей (общепринятые сокращения, символы и т.д.).

В данное пособие включены также специальные рубрики:

Study help – содержит полезные советы по использованию стратегий изучения английского языка, а также рациональные приемы работы над лексическим и грамматическим материалом и т.д.

Progress Monitoring – представляет собой задание, стимулирующее рефлексивную самооценку процесса изучения английского языка и позволяющее студентам последовательно и адекватно отслеживать свои учебные достижения, успешность продвижения в овладении иностранным языком.

Progress Test – представляет собой тест рубежного контроля, включающий задания на проверку, осмысление и закрепление изученного материала.

Учебно-методическое пособие разработано с использованием аутентичных материалов, основными источниками которых являются британские и американские академические и научно-популярные издания, Интернет, проспекты ведущих университетов англоязычных стран, энциклопедии, словари. При подборе учебных материалов учитывались такие характеристики, как новизна информации, ее познавательность, соответствие учебным и профессиональным потребностям студентов.

Для осуществления самооценки предполагается использование балльно-рейтинговой системы контроля знаний. Пособие включает таблицу итогового контроля, который предполагает полное и правильное выполнение ключевых заданий и теста рубежного. Выполнение заданий рассчитывается в баллах и оценивается по следующей шкале: оценка «5»-100-85%, оценка «4» - 84-70%, оценка «3» - 69-50%, оценка «2» - 49% и менее.

The secret world of microbes

Bacteria are the dark matter of the biological world with 4 million mostly unknown species in a ton of soil.— Edward O. Wilson

Learning Objectives:

- ✓ organize information in a timeline
- ✓ use time and sequence expressions for narrating and reporting
- ✓ revisit Past Tenses
- ✓ talk about the history of Microbiology
- ✓ process and summarize information for a talk
- ✓ extend vocabulary through synonyms
- ✓ organize and develop ideas into an essay

Lead in

1. Answer the questions.
   a) What does microbiology study?
   b) What does prefix “micro-” mean?
   c) What prominent microbiologists do you know?

2. Work in groups. Discuss which of these facts are true.
   a) *There are approximately 10 times as many bacterial cells as human cells in the human body.*
   b) *Microbes are the oldest form of life on Earth.*
   c) *Researchers have studied about 50% of all of the microbe species on Earth.*
   d) *Microbes, by weight, represent 60 percent of the biomass of all life on Earth!*
   e) *Microbes do not produce oxygen we breathe!*
   f) *Half of the microbes identified cause diseases.*
   g) *Scientists estimate that 2-3 billion species share the planet with us.*

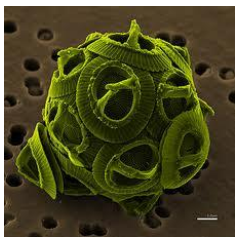
Reading

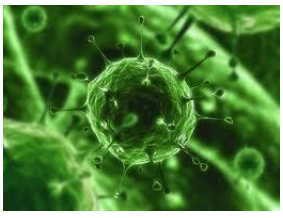
1. Match the pictures of microbes with their names

1) bacteria 2) viruses 3) fungi
4) protozoa 5) algae 6) archaea

a) 

b) 

c) 

d) 

e) 

f) 

2. Before you read check the pronunciation of the following words.

bacteria	[bækˈtɪəriə]	protozoa	[ˌprəʊtəˈzəʊə]
viruses	[ˈvaɪrəs]	archaea	[ɑrˈkiːə]
fungi	[ˈfʌŋgaɪ]	protist	[proʊtist]
algae	[ˈældʒiː]	eukaryotes	[juːˈkærɪə(ʊ)t]
germ	[ʤɜːm]	prion	[ˈpriːɔn]
prokaryotes	[proʊˈkærioʊts]		

Life on Earth began early in our planet's history with microscopic organism, or microbes. Microbial life has since shaped our atmosphere, our geology, and the energy cycles of all ecosystems. A human body contains ten times as many microbes as it does human cells, including numerous tiny bacteria on the skin and in the digestive tract. Throughout history, humans have had a hidden partnership with microbes ranging from food production and preservation to mining for precious minerals. Yet throughout most of our history, humans were unaware that microbes even existed

The discipline of science dealing with the laws of life and development of organisms particularly microscopic or submicroscopic forms of life, which are usually invisible to the naked eye, is called microbiology. This includes eukaryotes such as fungi and protists, and prokaryotes. Viruses and prions, though not strictly classed as living organisms, are also studied. It is also associated with the changes which such forms bring about in other organisms and in nonliving matter.

Microbes are everywhere, but we can't see them. These mysterious microscopic organisms play a very important role in our lives. Some make us sick but many more are helpful. Microbes are very diverse they have an amazing variety of shapes and sizes, and they can exist in a wide range of habitats from hot springs to the icy wastes of Antarctica and inside the bodies of animals and plants. Microbes live in the soil and the rocks - just think every time you walk on the ground you step on millions of microbes.

Two different words are in common use as inclusive designations for microscopic forms; the first being "microorganism" and the other the "microbe". The latter word has been derived from French and was introduced in 1878 by a French surgeon, C.E. Sedillot. Sometimes the term "germ" is also used.

Microbiology is a broad term which includes virology, mycology, parasitology, bacteriology, microbial physiology, medical microbiology, veterinary microbiology, environmental microbiology, aeromicrobiology, even nano microbiology and many other branches.

Microbiology is researched actively, and the field is advancing continually. It is estimated only about one percent of all of the microbe species on Earth have been studied. Although microbes were directly observed over three hundred years ago, the field of microbiology can be said to be in its infancy relative to older biological disciplines such as zoology and botany. Its future appears very optimistic at least for two reasons. In comparison to other disciplines of science, the mission of microbiology is clearer. In the nineteenth century – the “golden age” of microbiology – microscopes revealed the tiny organisms at work in our bodies and in our ecosystems. The twentieth century saw the rise of microbes as the engines of biotechnology. Microbial discoveries led to recombinant DNA and revealed the secrets of the first sequenced genomes. Microbiology is confident to its value due to its tremendous practical significance. It has had a number of important applications for human welfare.

(Abridged and adapted from Microbilogy Online)

3. Answer the questions.
    a) Where does the word micro come from?
    b) Who is the word microbe credited to?
    c) What does microbiology investigate?
    d) Where do microbes live?
    e) How do microorganisms influence our lives?

f) What branches does microbiology consist of?

g) How many microbes have been already investigated?

h) When was the first microbe discovered?

i) Why does the future of microbiology seem to be very optimistic?

j) What other words with the prefix micro do you know?

4. Look back in the text and find the words with the similar meaning to the following.

a) microscopic -

b) unaided -

c) various/different -

d) term/word -

e) territory -

f) not revealed -

g) unseen -

h) the early development -

5. Find the proper words from the text to match the following definitions.

A	B
1) **microbial physiology**	a) the study of the function and diversity of microbes in their natural environments and the study of microbial ecology
2) **medical microbiology**	b) the study of fungi, their genetic and biochemical properties, their taxonomy and use to humans as well as their dangers, such as poisoning or infection
3) **veterinary microbiology**	c) the study of how the microbial cell functions biochemically including the study of microbial growth, microbial metabolism and microbial cell structure
4) **environmental microbiology**	d) the study of those microorganisms at nano level
5) **aeromicrobiology**	e) the study of the role in microbes in veterinary medicine or animal taxonomy

6) nano microbiology	f) the study of airborne microorganisms
7) mycology	g) the study of the pathogenic microbes and the role of microbes in human illness

6. Find in the text all words and phrases that refer to the following:

   a) size b) amount

Focus on language

1. Prefix, stem and suffix are three parts of the word. It is possible to guess the meaning of the word if you know the meaning of the prefix or suffix. Refer the prefixes below to the categories:

Size	***Number/amount***	***Other/negative***

ir-	multy-	im-	mega-	oct-
bi-	dec-	micro-	un-	tri-
mini-	mono-	nano-	non-	mis-

2. Match each word in column A with the meaning of its prefix in column B. Translate the words into your native language. Use a dictionary if necessary.

A	**B**
1) megahertz	a) eight
2) misunderstand	b) not

3) monologue	c) badly or wrongly
4) octagon	d) very small
5) macroeconomics	e) two
6) bilingual	f) one million
7) microchip	g) on a large scale
8) impossible	h) one

Discuss

- Do you agree that the future of microbiology appears very optimistic? Why?/Why not?
- Do microbes affect our lives for better or for worse?
- Comment on the saying by Jack Gilbert "The world is mostly microbes".

Get real

Go online and find information about microbes. "Issue" a passport of two microbes - the good and the bad. Be sure to include:

- microbe's name
- group it belongs to
- its discoverer
- time and country it was discovered
- its address
- effect or area of application

Reading

1. Read the text about the early history of microbiology. Complete the timeline below that demonstrates its evolution.

   Microbiology has had a long, rich history, initially centered in the causes of

infectious diseases. Until about 1600 A.D. all knowledge of the form, structure and life processes of plants and animals was narrowly restricted to what could be seen with the naked human eye. Microorganisms were merely "fabulous monsters". That's why the science of microbiology really started with the invention of the microscope.

It was Roger Bacon in 1267 who developed a lens for the first time. Zaccharias Janssen and son Hans Jansen about 300 years later first produced a crude type of microscope by placing two lenses together without any provision for focusing. Galileo Galilei (1610) prepared a microscope with a focusing device called 'occiale'. Till then, the name 'microscope' had not been in use and it was first proposed by Faber (or Fabri) in 1625. However, the advent of such optical lens systems did not reveal the existence of microorganisms.

Study help: *Time lines*
The time line provides a study tool that allows you to organize information that is presented chronologically. Time lines would be effective to use in classes in which you present historical, biological and other developments.
To make the order clear and to show the sequence of events, we mention dates and time, and we also use various links and connectives.

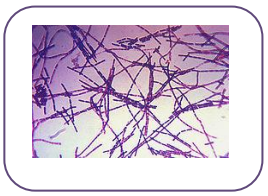
An English scientist Robert Hooke made and used a compound microscope in the 1660s to describe microscopic creatures in his classic "Micrographia". Although Hooke's highest magnifications allowed revealing bacteria, he could not see them probably because he studied mainly opaque objects in the dry state by reflected light. However, his pictures of "white moulds" were very informative and accurate.

The exact beginning of the knowledge about the existence of microorganisms can be traced back only to the end of the 17th century when Marcello Malpighi in Italy and Antonie van Leeuwenhoek in the Netherlands, were using microscopes to look at animal and plant tissues. Antony van Leeuwenhoek first recorded observations of microorganisms seen in water, faeces, etc. He called them animalcules.

Although there were many reports of works on microorganisms, it was O.F. Muller who gave first classification of bacterial microbes in 1773 and 1788, and coined the terms "Vibrio" and "Monas" for certain forms, while Ehrenberg established a new genus 'Bacterium' in 1829.

Leeuwenhoek's animalcules took two centuries to cause any spurt among the scientists when their importance was realized. During that period some form of microbiological treatment was practiced by many people but this was with very little understanding of the microbial processes involved. Only in 1796 Edward Jenner, who is credited with the invention of inoculation, injected cowhand James Phipps with cowpox and the boy did not develop smallpox. Jenner gets the credit because he carried out his work using accepted scientific method and wrote it up afterwards giving birth to the science of immunization.

Louis Pasteur was probably the greatest biologist of the 19th century. In 1857 he showed that fermentation - a process used in baking and brewing - was caused by microorganisms. As a result of this work he went on to develop the process for sterilizing milk and this was named after him - pasteurization. He is also credited with the development of vaccines, most notably for rabies and anthrax. In the mid 60s he developed the germ theory of disease, which was a significant breakthrough in medicine that ultimately improved the health of everyone on the planet. But his attempts to prove the germ theory were unsuccessful.



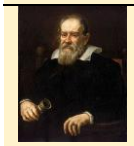
Ten years later the German scientist Robert Koch confirmed germ theory of disease by cultivating anthrax bacteria apart from any other type of organism. The procedures used by Koch came to be known as Koch's postulates. They provided a set of principles whereby other microorganisms could be related to other diseases.

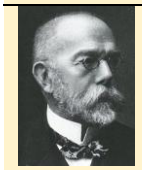
Microbiology boosted when high-magnification microscopes of good optical

quality became more widely available. The most notable person was Ferdinand J Cohn who in 1875 effectively founded the science of bacteriology. The classification of bacteria and the term Bacillus were credited to him.

Since the time of these pioneers, almost every year major breakthroughs in microbiological science have been made. Both individuals and, more recently, teams of people have contributed to our understanding of the science. They have taken it from being primarily a branch of medicine to become a means of food production, a branch of study for engineers and an integral part of understanding ecology and the environment.

(Adapted from the Internet sites)

 …….	developed a lens
 …….	
 1590	……
 …….	a microscope with a focusing device called 'occiale'
 …….	…….. ……
 …….	

 1667	
	
	Edward Jenner ……..
	
	developed the process of pasteurization
1864	developed the germ theory of disease
	Robert Koch confirmed germ theory of disease …….
	……. the science of bacteriology

2. Look back through the text and underline all time and sequence expressions.

3. Match the verbs in A with the nouns in B to make up word combinations used in the text.

A	B
1. make	a) principles
2. confirm	b) credit

3. use	c) a term
4. provide	d) observations
5. give	e) breakthroughs
6. get	f) the importance
7. found	g) classification
8. coin	h) a science
9. record	i) procedure
10.realize	j) a theory

4. Find in the text verbs that collocate with the following nouns

• science	• theory	• bacteria

5. Find in the text nouns that collocate with the verb ***to develop***.

6. Find in the text a synonym for each group of words given in the list below.

a) most important, key, main

b) beginning, dawn, start

c) rough, unsophisticated, simply made

d) wonderful, remarkable, amazing

e) limit, confine, control

f) prove, provide evidence, verify

g) make known, disclose, show

h) acknowledge, admit, recognize

i) invent, introduce, create

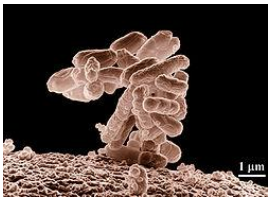
j) increase, advance, develop

Add new vocabulary to your vocabulary notebook. ✍

Speaking

Sum up your previous knowledge and facts from the text about microbiology. You may start like this:

"Microbiology appeared as a separate science only in the 19th century when the classifications of microbial organisms were given, a scientific method for inoculation was developed and the germ theory of disease was confirmed. However, the attempts to investigate microorganisms and develop tools to assist these studies were made long before the 19th century. That's why I do not believe any one individual can be called the forefather of microbiology but one should name several outstanding scientists. I would like to start with…"



Get real

Search the Internet and/or any popular science magazines to find information on any area of biology. Create a timeline to demonstrate its development.

Functional language: ***Time and sequence***

Time

In 1942, ...
In the year …
During the 20th century, ...
A decade ago ...

Sequence

Before .../Before this, …
Previously, …
Later on …

When/As soon as/After …
During this period, …
Throughout this period, …

For the following … years, …
… years later, …
Soon/Shortly/Immediately

Writing

Write a story describing the evolution of the area you have chosen. Make use of the timeline and time and sequence expressions.

Focus on language

1. Read the sentences. What grammar tenses are used?
   - *We **were** tired because we **had been experimenting** all day long.*
   - *The science of microbiology really **started** with the invention of the microscope.*
   - *The beginning of microbiology can be traced back to the end of the 17th century when Antonie van Leeuwenhoek **was using** microscopes to look at animal and plant tissues.*
   - *The name 'microscope' **had not been** in use till 1610 when Galileo Galilei prepared a microscope with a focusing device called.*

Past Tenses

- We use **Past Simple** talk about an activity or situation that began and ended at a particular time in the past.
- We use **Past Progressive** to say that something was going on around a particular time in the past or a longer background action or situation which was interrupted by a shorter action.
- We use **Past Perfect** to speak about an action which happened before another past action.
- We use **Past Perfect Progressive** to talk about an action or event continuing up to a specific time in the past. We put the emphasis on 'how long'.

2. List time expressions under the correct tense heading. Some expressions can be used more than once.

• for	• before	• already	• first
• since	• after	• ago	• until
• when	• while	• as soon as	• during

Past Simple	*Past Progressive*	*Past Perfect*	*Past Perfect Progressive*
……..	……		……

…….. …… ……. ……

…….. …… ……. ……

3. Complete the sentences with the correct Past tenses.

a) Class (*begin, already*) _____ by the time I (*get*) _____ there, so I (*take, quietly*) _____ a seat in the back.

b) My group mate (*discuss*) _____ something with professor when I (*walk*) _____ into the room.

c) It was midnight. I (*study*) _____ for five straight hours. No wonder I (*get tired*).

d) Millions of years ago, dinosaurs (*roam*) _____ the earth, but they (*become*) _____ extinct by the time humankind first (*appear*) _____.

e) I (*call*) Kate at nine last night, but she (*be, not*) _____ at home. She (*study*) _____ at the library.

f) Kevin suddenly realized that the teacher (*ask*) him a question. He couldn't answer because he (*daydream*) _____ for the last ten minutes.

g) I (*see, never*) _____ any of Picasso's paintings before I (*visit*) _____ the art museum.

h) The anthropologists (*leave*) _____ the village when they (*collect*) _____ enough data.

i) While Roger (*write*) _____ an essay his roommate (*clean*) _____ the room, so Roger (*cannot*) _____ concentrate and (*get*) _____ angry.

j) As I (*pass*) _____ the hardest exam and (*get*) _____ an excellent mark I (*feel*) _____ a know-it-all.

Listening

Listen to the part of a programme with Howard Markel, a professor of the history of medicine at the University of Michigan in Ann Arbor and co-director of the Center for History of Medicine. Take notes on the origin of the word **antibiotic**.

- ✓ *Origin of the word*
- ✓ *Meaning*
- ✓ *Date of introduction*
- ✓ *Person who used it first*
- ✓ *Context it was used in*
- ✓ *Person who coined it*
- ✓ *Meaning in medical sense*

Summarizing

1. Read the text "Д. И. Ивановский - основоположник вирусологии" and find the Russian equivalents to these English word combinations.
   1) to be afflicted with a disease
   2) to be engaged in research and teaching
   3) the forefather of virology
   4) a porcelain filter
   5) to cause a disease
   6) a causative agent of mosaic
   7) a tobacco mosaic disease
   8) the tobacco mosaic virus
   9) to acknowledge outstanding merits
   10) to make a prominent discovery
   11) nature of a causative agent
   12) infectious properties

13) the cornerstone of a new science
14) to retain bacteria
15) to improve an anti-rabies vaccine
16) an infected plant
17) the hypothesis of bacterial origin
18) to destroy tobacco plants

Д. И. Ивановский - основоположник вирусологии.

Пока ученые вели в микробиологических лабораториях борьбу с возбудителями, видимыми в световые микроскопы, а Л. Пастер совершенствовал свою вакцину против бешенства, не зная природы его возбудителя, в Петербурге выдающийся русский физиолог растений и микробиолог Дмитрий Иосифович Ивановский совершил в 1892 г. важное открытие, которое стало краеугольным камнем новой науки - вирусологии.

Д. И. Ивановский окончил физико-математический факультет Петербургского университета в 1988. Занимался научной и педагогической деятельностью в Петербургском (1895—1901), Варшавском (1901—1915) и Донском (1915-1920) университетах, заведовал Ботаническим садом.

Еще, будучи студентом, Дмитрий Ивановский интересовался болезнями растений и изучал на Украине и в Молдавии распространение рябухи, уничтожавшей урожаи табака. Позднее его особенно заинтересовала мозаичная болезнь этого растения, ранее смешиваемая с рябухой.

Он проделал следующий опыт - растер листья больных растений, их сок процедил через полотно и при помощи капиллярных трубочек впрыснул эту жидкость в жилки здоровых листьев табака. Через две недели 80%

инфицированных растений были поражены мозаичной болезнью. Ученый пропустил сок через фарфоровый фильтр, задерживающий бактерии, но его инфекционные свойства сохранились. Оказалось, что возбудитель мозаики не растет на обычных питательных средах, как бактерии. На заседании Императорской Академии наук в 1892 г. Ивановский доложил о результатах своих опытов. В заключение доклада он высказал гипотезу о бактериальном происхождении мозаичной болезни табака. Он полагал, что фильтрат содержит либо мельчайшие бактерии, либо токсин, выделенный ими и способный вызвать заболевание. В дальнейшем Ивановский обнаружил в клетках больных растений кристаллические включения и отстаивал мнение о том, что возбудитель мозаичной болезни имеет твердое инфекционное начало.


Вирусы табачной мозаики (электронное увеличение)

Особые организмы, вызывавшие болезнь, - вирусы мозаичной болезни табака - удалось увидеть впервые только в 1939 г. в электронный микроскоп. Однако именно 1892 год считается годом открытия этих новых организмов - вирусов.

Наряду с работами по вирусологии, принесшими ему мировую известность, он проводил и другие исследования, в том числе в области почвенной микробиологии, физиологии и анатомии растений.

В знак признания выдающихся заслуг Д.И. Ивановского перед вирусологической наукой Институту вирусологии АМН СССР (ныне РАМН) в 1950 году было присвоено его имя.

(Биографии и библиографии http://dino.disneyjazz.net/biogr.html)

Add new vocabulary to your vocabulary notebook. ✍

2. Read the text again and summarize it in English. Make sure you use the phrases for summarizing.

Phrases for summarizing	
The article discusses / considers…	The article informs / presents information about…
It is reported /said /stated that…	It is pointed out / claimed that…
Actually; In fact; In particular; For example; Also; Moreover; etc.	

Get real

Make up a quiz 'Famous Biologists and their Accomplishments'. Follow these guidelines:

- ✓ *Think of at least three outstanding biologists who are not mentioned in this unit.*
- ✓ *Search the Internet to find some information about these scientists.*
- ✓ *Make notes of their most significant achievements.*

Speaking

Prepare and give a short talk about some famous biologists. Don't give their names. The rest of the group will have to guess the names of the scientists. The one who guesses the most becomes the winner.

Example:

> *A Russian scientist who showed that brain activity is linked to electric currents and was the first to introduce electrophysiology. He laid the foundations for neuroscience.*
>
> *(Ivan Sechenov)*

In the Realm of Science

Here are some of the prefixes and suffixes (**a** to **k**) widely used in biological fields. Add more words with the same prefix/suffix to each group.

Prefix/Suffix	Definition	Example
ab-	*away from*	abnormal - departing from normality
aer- / aero-	*air, oxygen*	aerobic - with oxygen
calor-	*heat*	calorie - the energy content of food in the form of heat
cata-	*down, lower, under*	catabolic pathway - metabolic pathway that breaks down complex molecules into simple molecules, resulting in the release of energy
chrom- / chromo-	*color*	chromoplast - plant cell with yellow and orange pigments
cyto-	*cell*	cytosol - semifluid component of a cells cytoplasm
diplo-	*double*	diploid cell - cell containing two sets of chromosomes
-duct	*to lead*	aqueduct - a channel or passage that leads to an organ or body part
ecto-	*outer, external*	ectotherm - an organism that uses external heat to regulate its body temperature
epi-	*above*	epiphyte - a plant that grows on the surface of another plant for support
erythro-	*red*	erythrocyte - red blood cell
eu-	*good, well, true*	eukaryote - organisms whose cells contain a "true" membrane bound nucleus
-ectomy	*remove, excise*	tonsillectomy - surgical removal of the tonsils
fil-	*thread*	filum - a thread-like anatomical structure
-ferent	*carry, bring*	afferent - carry inward to a central organ or region
gymno-	*naked*	gymnosperms - vascular plants that bear naked or unenclosed seeds
-genic	*producing, generating*	carcinogenic - a cancer producing substance or agent
haplo-	*single*	haploid - having a single set of chromosomes
hetero-	*other, different*	heterozygous - having two different alleles for a given trait
homo-	*same*	homozygous - having two alleles for a given trait that

		are the same
hyper-	*above, excessive*	hyperthyroidism - condition resulting from the excessive production of thyroid hormones
hypo-	*under, beneath, lacking*	hypodermic - of or pertaining to the parts under the skin
iso-	*equal*	isogamy - fusion of male and female gametes that are the same size and structure
-itis	*inflammation*	appendicitis - inflammation of the appendix
karyo-	*nucleus, nut*	karyogamy - uniting of cell nuclei; fertilization
-kinesis	*movement, motion*	cytokinesis - movement of the cytoplasm

(By Regina Bailey, Biology Prefixes and Suffixes, About.com Biology)

Progress Monitoring

You have worked on the vocabulary on the topic ***"The Secret World of Microbes"***. Tick (**V**) the points you are confident about and cross (**X**) the ones you need to revise.

	1. to make a breakthrough
	2. to found a science
	3. to realize importance
	4. to be credited with/to
	5. infectious properties
	6. to be of great/tremendous significance
	7. to contribute to the understanding of the science
	8. . to record observations
	9. forefathers of microbiology
	10.to provide principles/postulates
	11.to give a classification
	12.to propose/coin/introduce a term
	13.to confirm/prove a theory
	14.to develop a method/tool

15.the cornerstone of a new science

16.to be engaged in research and teaching

17.to make a prominent discovery

18.to improve an anti-rabies vaccine

19.to acknowledge outstanding merits

20.to lay the foundation of smth

Progress test

1. Cross out the odd word.
   a) effort, attempt, effect, try
   b) to study, to inform, to investigate, to research
   c) to establish, to found, to set up, to give birth
   d) vision, advent, beginning, coming
   e) to propose, to coin, to invent, to credit
   f) procedure, process, method, postulate
   g) approach, discovery, invention, breakthrough
   h) accurate, crude, precise, exact

2. Give English equivalents to these Russian word combinations.
   a) подтвердить теорию
   b) основатель иммунологии
   c) показать существование крошечных микроорганизмов
   d) придумать новый термин
   e) быть краеугольным камнем
   f) микробная теория
   g) заложить фундамент чего-либо
   h) инфекционное заболевание

3. Complete the paragraph with the appropriate past tense form of the verbs in brackets.

Peter _____1_____ (*get)* into a lot of trouble a couple of days ago when he _____2_____ (*have*) his chemistry lab class. While the teacher _____3_____ *(explain)* the procedure of the experiment he _____4_____ *(look*) out of the window and _____5_____ *(daydream*). When students _____6_____. *(start)* heating the substances he by mistake _____7_____ *(take)* the wrong test tube. He _____8_____ (be frightened) nearly to death to see the substance going out of the tube and splitting on the desk and his clothes. The teacher ____9_____ (*be)* very angry with him, though he ___10_____ *(be)* glad Peter _____11_____ *(remember*) to wear safety glasses before starting the experiment. Anyway, Peter's lab work ____12_____ *(be)* a complete failure.

4. Write the word and the Russian equivalent next to each transcription.

a) *['prɔpətɪ]*	*property*	*свойство*
b) ['maɪkrəʊ]		
c) ['tɪʃu:]		
d) [ʤɜ:m]		
e) ['kʌltɪveɪt]		
f) [dɪ′zi:z]		
g) ['breikəru:]		
h) ['vaɪrəs]		

Credit Points

Tasks	**Get real**	**Speaking**	**Get real**	**Writing**	**Speaking**	**Summarizing**	**Progress test**	**Total**
Maximum score	5	10	10	10	10	10	35	90
Your score								
%								

Script

Listen to the talk with Howard Marker, a professor of the history of medicine at the University of Michigan in Ann Arbor and co-director of the Center for History of Medicine

Journalist: What's our word for today?

Dr. MARKEL: Well, it's - represents one of the great miracles of modern medicine: antibiotics.

Journalist: Antibiotics. It's a compound word it sounds like.

Dr. MARKEL: It is. It's two words. And it really comes from the Greek and Latin roots for against life. Ironically, it wasn't used in the way that we know it, as a drug that you take for an infection, until 1943 when Selman Waksman, who is a very famous microbiologist and himself invented or discovered 20 antibiotics, used that word in that fashion.

Journalist: Mm-hmm. And we normally think of the first antibiotic being from penicillin.

Dr. MARKEL: Yeah. But before we get to penicillin, I want to take you back about 120 years before 1943 because antibiotics' original meaning -it comes, as I said, from the root for against life - described in opposition to believing in the presence or the possibility of life outside the planet Earth.

Journalist:: Oh...

Dr. MARKEL: A very famous naval commander, Matthew Maury, he was a founder of the U.S. Naval Observatory. And he actually coined the word antibiotic in his 1860 textbook "Physical Geography of the Sea and Its Meteorology." And, you know, you could imagine Maury look at the stars quite a bit through a telescope and a sextant as he attempted to chart the seas and winds and currents. And he argued in his book against extra terrestrial life forms. He said, I incline to the antibiotic hypothesis, so very different meaning.

Journalist:: Oh, that's cute.

Dr. MARKEL: Now it (unintelligible) a lot of favor in the 1870s and '80s to mean aliens from outer space. But by 1890, it was revised by a French microbiologist named Pierre Vuillemin. And he used it to describe any compound or chemical that was injurious or destructive to living matter, especially microorganisms. But he was really riffing on a much different anti-life concept called antibiosis.

And that was the term that both Louis Pasteur and Robert Koch used in 1877, when they were describing how there were certain airborne bacteria that were floating around their labs and it inhibited the growth of their anthrax cultures. They were studying anthrax individually in order to establish the germ theory. Well, the key, of course, was finding out exactly what was causing that inhibition.

And in the decades that followed, many, many scientists search for such agents, but the catch was many times, most times the substances they use were so toxic that they not only kill the infecting

microbes, they also seriously harm the people who are taking the medication. And the great example of that was Dr. Paul Ehrlich's famous magic bullet for syphilis, which was called Salvarsan 606. And professionally, that was just a variant of arsenic, something most of us would not elect to take.

Journalist:: So we go fast forward to Fleming and the Penicillium mold and that's where the first...

Dr. MARKEL: Yeah. That's where the birth really begins. It's 1928 and Alexander Fleming was a bacteriologist at London's St. Mary's Hospital. And he discovered a Penicillium mold of fungus had contaminated his laboratory. But he had this eureka-like moment when he noticed how well that fungus inhibited the growth of specific types of bacteria he was (unintelligible) to culture. And we now know that, you're right, as penicillin...

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