

МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ РОССИЙСКОЙ
ФЕДЕРАЦИИ

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**ОБУЧЕНИЕ ПЕРЕВОДУ
СПЕЦИАЛЬНЫХ ТЕКСТОВ
ПО БИОЛОГИИ**

ЧАСТЬ 2

Практикум

Рекомендовано методической комиссией Института филологии и журналистики для студентов ННГУ, обучающихся по направлениям подготовки 06.03.01 «Биология», 05.03.06 «Экология и природопользование»

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Данное пособие – вторая часть практикума «Обучение переводу специальных текстов по биологии». Пособие рассчитано на закрепление и развитие практических навыков работы с профессиональными текстами биологической и экологической тематики. В этой части уделяется внимание последовательному переводу с русского языка на английский, а также абзацно-фразовому двустороннему переводу интервью.

В основу практикума положены тексты, взятые из аутентичных источников. Также на их базе составителями разработан комплекс упражнений, направленный на обучение переводу научных и научно-популярных текстов по избранной специальности.

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CONTENTS

UNIT 1. HIV'S HISTORY TRACED	4
UNIT 2. ATKINS-STYLE DIETS CAN BE LIFE-THREATENING, DOCTORS WARN	10
UNIT 3. NUTRITION AND BRAIN	18
UNIT 4. GENETIC ENGINEERING	37
UNIT 5. HEALTHIER FOOD FOR HEALTHIER PLANET	53
UNIT 6. ECHOLOCATION OF BATS.....	58
REFERENCES	63

UNIT 1. HIV'S HISTORY TRACED

1. Read and translate the following international words:

Race, killer, vaccine, population, virus, genetic, spread, type, scenario, retrospective, incubation, infect, historical, chimpanzee, hypothesis, steward, homosexual, epidemic, suggest, immune.

2. First scan then read the text. While scanning try and find answers to these questions:

1. When did HIV arrive in the United States for the first time?
2. What is Kenneth's job?
3. Where is Kenneth's lab located?
4. How long does HIV's incubation period last?

3. Translate the following text:

HIV'S HISTORY TRACED

New evidence has emerged that HIV was racing through the US population long before doctors woke up to a new killer disease called AIDS. The study might also help the hunt for an HIV vaccine.

Researchers have reconstructed the virus' past using the few remaining blood samples taken during the 1980s from AIDS patients in New York, California and Georgia. They fed the HIV genetic sequences into a new type of statistical analysis that compares them with more contemporary ones, to estimate how fast the virus has changed and spread.

The technique "looks back in time", says researcher Kenneth from Georgia. The results support the idea that HIV arrived in the United States around 1968, long before the first AIDS cases appeared. AIDS was first reported in 1981 and was retrospectively recognized as having struck in the late 1970s. This is compatible with HIV's roughly ten-year incubation period.

From the start, the virus probably spread like wildfire. The rapid spread of the virus might help to explain why the disease finally came to light. It could have been because spiraling numbers passed a critical point.

HIV is thought to have jumped from African chimpanzees into humans, perhaps when they ate infected meat. Then one strain, called HIV-1, spread all over the world. Researchers are still unclear exactly how HIV arrived in the United States. One hypothesis suggests that Canadian air steward Gaetan Dugas – dubbed Patient Zero – brought in the disease and spread it to many homosexual partners.

The latest study, which includes Patient Zero's genetic sequence, fits a different scenario: that the disease entered many different times independently. Even early in

the epidemic, the group found, the viruses in different cities were distinct from one another. This supports another popular theory: that HIV may have hitched a ride with tourists arriving from Haiti.

The historical reconstruction also contains a lesson for today's vaccine researchers. Contemporary strains are more closely related to their ancestral ones than they are to each other. This suggests that future vaccines, which researchers hope will prime the immune system to attack any HIV strain that they encounter, would be best based on an ancestral sequence. Early work on such vaccines is already under way, says Kenneth.

by Helen Pearson [<http://biohorizons.oxfordjournals.org>]

4. Match the synonyms:

- | | |
|------------------|-----------------|
| 1. meet | A. historical |
| 2. distinct | B. contagious |
| 3. illness | C. contemporary |
| 4. group | D. different |
| 5. researcher | E. scientist |
| 6. today's | F. team |
| 7. remain | G. disease |
| 8. retrospective | H. rapid |
| 9. infectious | I. encounter |
| 10. roughly | J. theory |
| 11. call | K. around |
| 12. fast | L. stay |
| 13. hypothesis | M. dub |

5. Match the antonyms:

- | | |
|-----------------|--------------|
| 1. contemporary | A. slow |
| 2. attack | B. fact |
| 3. different | C. ancestral |
| 4. doctor | D. emerge |
| 5. rapid | E. patient |
| 6. future | F. defend |
| 7. disappear | G. outdated |
| 8. hypothesis | H. same |

6. Match the words on the right with the suitable attributes on the left and translate the resulting word combinations:

- | | |
|---------------|---------------|
| 1. historical | A. researcher |
| 2. ancestral | B. chimpanzee |

- | | |
|-----------------|-------------------|
| 3. vaccine | C. numbers |
| 4. genetic | D. steward |
| 5. African | E. analysis |
| 6. immune | F. period |
| 7. AIDS | G. reconstruction |
| 8. incubation | H. sequence |
| 9. critical | I. system |
| 10. air | J. point |
| 11. infected | K. spread |
| 12. spiraling | L. patient |
| 13. HIV | M. vaccine |
| 14. rapid | N. sequence |
| 15. statistical | O. meat |

7. Match the words on the left with their definitions on the right:

- | | |
|------------|--|
| hypothesis | A. someone who does experiments, especially to collect relevant facts and ideas |
| chimpanzee | B. an example or small amount of something that shows you what all of it is like |
| technique | C. an idea that attempts to explain something but has not yet been tested or proved to be correct |
| diseased | D. an African animal with black or brown fur that lives and hunts in groups. It belongs to the ape family, which is the most similar to humans |
| vaccine | E. a substance put into the body, usually by injection, in order to provide protection against a disease |
| epidemic | F. a simple living thing that is smaller than a bacterium and can enter your body and make you ill |
| disease | G. an illness that affects people or animals, especially one that is caused by infection |
| deceased | H. not influenced or affected by something |
| researcher | I. affected by an illness |
| immune | J. a pattern of chemicals within a cell that carries information about the qualities passed on to a living thing from its parents |
| sample | K. a situation in which a disease spreads very quickly and infects many people |
| gene | L. a method of doing something using a special skill that you have developed |
| virus | M. dead |

8. Answer these questions on the text:

1. What do abbreviations HIV and AIDS mean?
2. What apes has HIV probably jumped from?
3. What kind of technique do vaccine researchers use to clarify the history of HIV and AIDS?
4. What appeared first in the United States – HIV or AIDS cases?
5. How did researchers manage to reconstruct the virus' past?
6. What did Gaetan Dugas do for a living?
7. What has the latest study of AIDS cases shown?
8. How could Dugas possibly spread HIV?
9. When was AIDS first reported in the United States?
10. What lesson does historical reconstruction contain for today's vaccine researchers?

9. Complete the sentences using the words and phrases:

rapid spread, incubation period, to estimate, blood samples, population, under way.

1. Persistent work on HIV vaccines is already _____.
2. HIV has been racing through the African _____ since the 1980s.
3. HIV's _____ is roughly ten years.
4. To attack any HIV strain a lot of _____ are to be taken from those already infected.
5. The _____ of the virus resulted in the AIDS epidemic.
6. _____ how fast HIV has changed and spread researchers have reconstructed the virus' past.

10. Say whether the following statements are true or false. Comment on the true statements and correct the false ones.

1. The first AIDS patients had arrived in the United States before the first HIV case appeared.
2. HIV has jumped from humans into African chimpanzees.
3. HIVs in different towns may be distinct from one another.
4. Researchers have defined exactly how HIV arrived in the US.
5. The AIDS epidemic was retrospectively recognized as having struck in the late 1970s.
6. Kenneth and his colleagues have definitely proved that HIV was brought to the US by Haitian tourists.

11. Read and translate the following texts

HIV – HUMAN IMMUNODEFICIENCY VIRUS

Retrovirus associated with AIDS

HIV attacks and gradually destroys the immune system, leaving the host unprotected against infection. It cannot be spread through casual contact but instead is contracted mainly through exposure to blood and blood products (e.g., by sharing hypodermic needles or by accidental needle sticks), semen and female genital secretions, or breast milk. A pregnant woman can pass the virus to her fetus across the placenta.

The virus first multiplies in lymph nodes near the site of infection. Once it spreads through the body, usually about 10 years later, symptoms appear, marking the onset of AIDS. Multi-drug "cocktails" can delay onset, but missing doses can lead to drug resistance.

Like other viruses, HIV needs a host cell to multiply. It attacks helper T cells and can infect other cells. A rapid mutation rate helps it foil both the immune system and treatment attempts. No vaccine or cure exists. Abstinence from sex, use of condoms or other means to prevent sexual transmission of the disease, and avoidance of needle sharing have reduced infection rates in some areas.

AIDS – ACQUIRED IMMUNODEFICIENCY SYNDROME

Fatal transmissible disorder caused by HIV

AIDS, the last stage of HIV infection, is defined by the appearance of potentially lethal opportunistic infections. The first AIDS cases were identified in 1981, HIV was isolated in 1983, and blood tests were developed by 1985. In 2002 approximately 40,000,000 people worldwide were living with HIV, and more than 25,000,000 had died of AIDS. In the U.S. some 2,000,000 people had been infected with HIV, 800,000 had been diagnosed with AIDS, and 450,000 had died.

Sub-Saharan Africa remains the focus of infection, but the number of cases in South and Southeast Asia and elsewhere continues to mount at an alarming rate as well. An initial acute illness usually resolves within weeks. Infected persons then generally have few or no symptoms for about 10 years. As the immune system deteriorates, they develop diseases such as *Pneumocystis carinii* pneumonia, cytomegalovirus (CMV), lymphoma, or Kaposi sarcoma.

[*Encyclopaedia Britannica*]

FROM TIME IMMEMORIAL

12. Translate the following text:

THE HORN OF PLENTY – РОГ ИЗОБИЛИЯ

The horn of plenty, or cornucopia, is the symbol of abundance. According to the myth, when Jupiter was a baby he was nursed by nymphs with the milk of

Amalthea, the goat. The broken horn of Amalthea filled with fruits, vegetables, and flowers was brought to Jupiter by one of the nymphs.

Jupiter presented the horn to the nymphs promising that it would become filled with whatever they wished. On this account it was called the horn of plenty.

Ceres, the goddess of the growing vegetation, is usually drawn by painters with the horn of plenty in her left hand. Sometimes the fruits, vegetables, and flowers are being poured on the Earth from the full horn, and sometimes they are held in it as in a basket.

13. Practice pronunciation and stress:

Amalthea [əmə'lθiə], Jupiter ['dʒu:pɪtə], Ceres ['siəri:z], myth [mɪθ], goddess ['gɒdɪs], cornucopia [kɔ:nju:'kəʊpiə], abundance [ə 'bʌndəns], nymph [nɪmf].

14. Make up questions in English to which the following Russian sentences would be answers. Do a two-way translation using both the statements and the questions

1. Рог изобилия является символом обеспеченной и сытой жизни, а также богатства.
2. Это выражение заимствовано из мифологии.
3. В одном из мифов рассказывается о том, что коза Амалфея, вскормившая своим молоком младенца Юпитера, однажды сломала себе рог.
4. Одна из нимф нашла его, наполнила плодами и преподнесла Юпитеру.
5. Юпитер подарил этот рог воспитавшим его нимфам.
6. Он обещал нимфам, что из этого рога появится все, чего бы они ни пожелали.
7. Богиня плодородия Церера обычно изображается с рогом изобилия в руках.

UNIT 2. ATKINS-STYLE DIETS CAN BE LIFE-THREATENING, DOCTORS WARN

1. Read and translate the following international words:

Diet, protein, vitamin, liver, diabetes, insulin, recommend, body, medicine, popular, safe, diarrhea, balance, compromise.

2. First scan then read the text. While scanning try and find answers to these questions:

1. What can low carbohydrate diets lead to?
2. How many kilos did the woman lose during a month-long period?
3. What is an obvious benefit of the Atkins diet?
4. What is ketoacidosis caused by?

3. Translate the following text

ATKINS-STYLE DIETS CAN BE LIFE-THREATENING, DOCTORS WARN

Low carbohydrate diets, such as the Atkins plan, can lead to life-threatening conditions, a medical journal warned yesterday. *The Lancet** described the case of an obese woman who had adhered strictly to the high-protein diet for a month before being admitted to hospital as an emergency. The 40-year-old, who had taken vitamin supplements recommended by the Atkins plan, needed treatment in the intensive care unit of a New York hospital. She had ketoacidosis, a condition triggered by the liver's production of ketones**, the acids which appear during periods of starvation or when there is a lack of insulin in the body due to diabetes.

When first admitted the patient felt nauseous and was dehydrated after vomiting for several days. She was short of breath and in "moderate distress". Four days later, after a dextrose*** drip, she was well enough to be discharged.

The doctors said the Atkins diet was largely to blame. Professor Klaus-Dieter Lessnau, who led the team from the New York School of Medicine, wrote: "Our patient had an underlying ketosis caused by the Atkins diet ... this problem may become more recognized because this diet is becoming increasingly popular worldwide".

The Atkins diet maintains that you can lose weight rapidly by cutting carbohydrates entirely from meals. For a month before she fell ill the woman admitted to the US hospital had lived on meat, cheese and salads. She had also taken vitamins recommended by the diet. As instructed in the original Atkins diet book, she monitored her urine twice daily. During this month-long period, she lost about 9 kg.

Commenting on the case elsewhere in *the Lancet*, Lyn Steffen, a doctor, and Jennifer Nettleton, from the University of Minnesota School of Public Health delivered a further warning about Atkins and other carb-cutting diets.

The pair wrote: "While the rapid weight loss seems to be an obvious benefit of the Atkins diet, bigger questions remain". First, is the diet safe? ... low carbohydrate diets for weight management are far from healthy, given their association with ketosis, constipation or diarrhea, halitosis, headache, and general fatigue to name a few side effects.

These diets also increase the protein load to the kidneys and alter the acid balance in the body, which can result in loss of minerals from bone stores, thus compromising bone integrity.

[<http://biohorizons.oxfordjournals.org>]

Notes

*The Lancet – British medical journal established in 1823, published weekly from New York and London.

Its founder and first editor, Thomas Wakley, considered at the time a radical reformer, stated that the intent of the new journal was to report on hospital lectures and describe important cases of the day. It has since played a significant role in medical and hospital reform movements in Britain and has become a highly prestigious medical journal around the world.

**Ketone – Any of a class of organic compounds containing a carbonyl group ($-C=O$) bonded to two carbon atoms.

Ketones can participate in many chemical reactions, though to a lesser extent than the related aldehydes. Many more complex organic compounds have ketones as building blocks. In ketosis, ketones produced by lipid metabolism accumulate in the blood and urine in abnormal amounts, usually because of starvation or a metabolic disease such as diabetes mellitus.

Their chief industrial use is as solvents and in the manufacture of explosives, lacquers, paints, and textiles. Acetone is the most important ketone; several sugars and some natural and synthetic steroids are ketones.

***Dextrose, or glucose, or grape sugar, or corn sugar – Organic compound, a simple sugar (monosaccharide), chemical formula $C_6H_{12}O_6$.

The product of photosynthesis in plants, it is found in fruits and honey. As the major circulating free sugar in blood, it is the source of energy in cell function and a major participant in metabolism. Control of its level and metabolism is of great importance. Glucose and fructose make up sucrose. Glucose units in long chains make up polysaccharides (e.g., cellulose, glycogen, starch). Glucose is used in foods, medicine, brewing, and wine making and as the source of various other organic chemicals.

4. Match the synonyms:

- | | |
|----------------|---------------|
| 1. starvation | A. care |
| 2. group | B. dextrose |
| 3. association | C. female |
| 4. treatment | D. famine |
| 5. glucose | E. important |
| 6. vital | F. quantity |
| 7. various | G. different |
| 8. woman | H. everywhere |
| 9. worldwide | I. connection |
| 10. amount | J. team |

5. Match the antonyms:

- | | |
|-----------------|-----------------|
| 1. decrease | A. slow |
| 2. great | B. concrete |
| 3. healthy | C. restricted |
| 4. doctor | D. availability |
| 5. rapid | E. patient |
| 6. constipation | F. more |
| 7. lack | G. minute |
| 8. general | H. increase |
| 9. less | I. ill |
| 10. free | J. diarrhea |

6. Match the words on the right with the suitable attributes on the left and translate the resulting word combinations:

- | | |
|---------------------|----------------|
| 1. high-protein | A. period |
| 2. life-threatening | B. dependence |
| 3. vitamin | C. woman |
| 4. month-long | D. journal |
| 5. moderate | E. supplements |
| 6. acid | F. loss |
| 7. insulin | G. diet |
| 8. weight | H. conditions |
| 9. medical | I. balance |
| 10. obese | J. distress |

7. Match the words on the left with their definitions on the right:

- | | |
|-----------------|---|
| 1. carbohydrate | A. the act of getting air into your lungs by inhaling it |
| 2. nausea | B. a serious medical condition in which your body does not produce enough insulin to reduce the amount of sugar in the blood |
| 3. obesity | C. the feeling that you are going to vomit (= bring food up from your stomach and get rid of it through your mouth. |
| 4. breath | D. liquid waste from a person's or animal's body |
| 5. constipation | E. a substance produced in your body that controls the level of sugar in your blood. People who have the disease "diabetes" do not produce enough of it |
| 6. kidney | F. organic compounds containing a carbonyl group ($-C=O$. bonded to two carbon atoms |
| 7. urine | G. the organ in your body that cleans your blood and produces bile (a liquid that helps your body process fat. |
| 8. diabetes | H. a condition in which someone is too fat in a way that is dangerous for his/her health |
| 9. insulin | I. a chemical substance with a PH value (= a measure used in chemistry. of less than 7 |
| 10. mineral | J. a substance in food such as meat, eggs, and milk that people need in order to grow and be healthy |
| 11. strain | K. a natural substance in some foods that you need for good health, for example iron and calcium |
| 12. dehydrated | L. a condition in which you cannot move solid waste out of your body easily |
| 13. halitosis | M. one of the two organs in your body that clean your blood and remove waste |
| 14. ketones | N. a piece of equipment used in a hospital for putting a liquid such as medicine directly into your body |
| 15. anorexia | O. a limited amount of food that someone eats because he/she is trying to become thinner |
| 16. liver | P. a substance found in foods such as sugar, bread, and potatoes. They supply your body mainly with heat and energy |
| 17. diet | Q. feeling weak or ill because you have lost a lot of water from your body |
| 18. acid | R. a medical condition in which your breath has a very unpleasant smell. A more usual phrase is <i>bad breath</i> |
| 19. drip | S. a serious illness that makes you want to stop eating and that mainly affects young women |
| 20. protein | T. a particular type of virus, animal, insect, or plant |

8. Answer these questions on the text

1. Why was a 40-year-old woman admitted to hospital as an emergency?
2. What kind of treatment did the woman need?
3. Why is the Atkins diet becoming increasingly popular worldwide?
4. What can a lack of insulin be caused by?
5. How can a person lose weight rapidly according to the Atkins diet?
6. What food was the woman living on for a month?
7. What vitamins was she taking?
8. Where and why was the woman admitted when she fell ill?
9. What diets are usually recommended for weight management?
10. Did the woman lose or put on weight? Why?
11. Are low carbohydrate diets for weight management really healthy?
12. Why did the woman monitor her urine twice daily?
13. Why are low carbohydrate diets for weight management not quite healthy?
14. What are the harmful effects of Atkins-style diets?
15. What is the best way to the rapid weight loss? Have you ever tried it?
16. What is ketoacidosis usually triggered by?

9. Complete the sentences using proper words and phrases:

diet, carbohydrates, fell, the liver's, the obese patient, side effects, weight.

1. My obese girlfriend is adhering strictly to the high-protein diet to lose ____.
2. The obvious benefit of the Atkins _____ is rapid weight loss.
3. Any person can lose weight rapidly by cutting _____ from meals.
4. Ketoacidosis is a condition triggered by _____ production of ketones.
5. When she _____ seriously ill Jane was immediately admitted to the hospital.
6. After inspecting _____, the doctors agreed that the Atkins diet was largely to blame for such consequences.
7. Diarrhea, halitosis, headache, and general fatigue are only a few _____ of Atkins-style diets.

10. Say whether the following statements are true or false. Comment on the true statements and correct the false ones.

1. The Atkins diet maintains that you can lose weight rapidly by cutting proteins entirely in your meals.
2. Poor unbalanced diets can affect the unborn baby.
3. If a person adheres strictly to the high-protein diet he/she will become obese.
4. *Maxim* and *Men's Health* have become most prestigious medical journals around the world.

5. According to diet books, dieting persons should monitor their urine twice daily.

6. Obesity is the result of the healthy lifestyle.

7. Abnormal dieting may result in anorexia.

8. Some low carbohydrate diets are good for weight management but are far from being healthy and safe.

9. If a person falls ill he/she must be immediately admitted to the hospital.

11. Translate or (if you cannot) render the following jokes based on puns:

1. – Is life worth living?

– It depends upon the liver.

2. To lose weight too fast you should resort to the fast.

12. Read and translate additional texts.

GLYCOGEN STORAGE DISEASE OR GLYCOGENOSIS

Any of numerous types of hereditary enzyme deficiency, resulting in altered metabolism of glycogen

The problems are classified in two groups, those affecting the liver and those involving striated muscle, both primary glycogen storage sites.

Symptoms in the liver group range from symptomatic hypoglycemia with ketosis to asymptomatic liver enlargement (hepatomegaly). In the muscle group, they range from weakness and cramps to fatal heart enlargement.

DIARRHEA

Abnormally fast passage of waste material through the large intestine, resulting in frequent defecation with loose feces and sometimes cramps

Causes range widely and can include cholera, dysentery, highly seasoned foods or high alcohol intake, poisons (including food poisoning), drug side effects, and Graves' disease.

Mild cases of diarrhea are treated with bismuth subsalicylate; extreme cases are treated with fluid and electrolyte replacement while the underlying disease passes.

Traveller's diarrhea affects up to half of people who travel to developing countries. Its prevention includes taking bismuth subsalicylate tablets, drinking only bottled or canned beverages, and eating only peeled fruits, canned products, and restaurant food that is well-cooked.

Severe cases require antibiotics. In cases of severe malnutrition, diarrhea is potentially lethal, and it is responsible for hundreds of thousands of deaths annually in underdeveloped countries.

HEADACHE

Pain in the upper portion of the head

Episodic tension headaches are the most common, usually causing mild to moderate pain on both sides. They result from sustained contraction of face and neck muscles, often due to fatigue, stress, or frustration. Headaches are treated with aspirin, acetaminophen, or other NSAIDs*.

Chronic daily headaches are similar but more frequent. They usually have a psychological cause and respond to certain antidepressants. They may also come from overuse of pain relievers.

Migraine and cluster headaches are vascular headaches. Headaches may also be caused by distension of arteries at the base of the brain, from fever, hangover, or an attack of high blood pressure. Headache can be a symptom of meningitis, hemorrhagic stroke, or tumour.

Note

*NSAIDs – nonsteroidal anti-inflammatory drugs.

Drugs that reduce inflammation and are effective against pain (see analgesic) and fever

Most are available without prescription and are usually used for short periods for mild pain. Aspirin is technically an NSAID, but the term is generally applied to a newer class of drugs, including ibuprofen and similar drugs (e.g., naproxen, ketoprofen) that, like aspirin, inhibit prostaglandin synthesis. They act with fewer side effects, but aspirin-sensitive people should not use them.

Encyclopaedia Britannica

FROM TIME IMMEMORIAL

12. Translate the following text into English:

A LUCULLUS FEAST – ЛУКУЛЛОВ ПИР

Lucullus was a rich Roman general and consul of the 1st century B.C. noted for his wealth and self-indulgence. On his return to Rome from wars, he retired from politics into leisure and luxury. On one occasion a very superb supper was prepared, and when asked who were to be his guests he replied, “Lucullus will sup tonight with Lucullus”. The luxurious banquets of Lucullus are described by Plutarch.

A Lucullus feast is a synonym for a magnificent banquet.

13. Practice pronunciation and stress:

Lucullus [lu:'kʌləs], politics ['pɒlɪtiks], leisure ['leɪzə], luxury ['lʌkjəri], luxurious [lʌg'zjuəriəs] superb [sju:'pə:b], consul ['kɒnsəl], banquet ['bæŋkwɪt], Plutarch [plu:'tɑ:k]

14. Make up questions in English to which the following Russian sentences would be answers. Do a two-way translation using both the statements and the questions.

1. Выражение *Лукуллов пир* употребляется в значении “великолепный, роскошный пир”.

2. Оно происходит от имени римского консула и полководца Лукулла.

3. Лукулл прославился не столько своими военными походами, сколько своими богатствами и пирами.

4. Именно ему приписывают метод насильственного очищения переполненного желудка (обычно – при помощи двух пальцев, вставляемых в гортань) после обильной трапезы с целью освободить его для того, чтобы иметь возможность отведать еще куда более изысканные деликатесы, которые будут поданы позже.

5. Рассказывают, что однажды он сказал: “Сегодня Лукулл ужинает у Лукулла”.

6. Эти его слова явились ответом на вопрос о том, кого же, собственно говоря, сразу после званого обеда он пригласил на роскошный ужин, который приказал подать.

UNIT 3. NUTRITION AND BRAIN

1. Practice the following for pronunciation and define them.

synaptic plasticity [sɪ'næp.tɪk plæs'tɪsəti]

cognition [kɒg'nɪʃ.ən]

hypothalamus [ˌhaɪ.pəʊ'θæl.ə.məs]

hippocampus [ˌhɪp.ə'kæm.pəs]

amygdala [ə'mɪɡ.də.lə]

docosahexaenoic acid [ˌdɒkɒsə,heksə,e'noɪk'æsɪd]

encephalization [ɛn,sɛf(ə)lɑɪ'zeɪʃ(ə)n]

linoleic acid [ˌlɪnə(ʊ)'li:ɪk'æsɪd]

2. Compare your definitions with the given below. Translate them.

In neuroscience, **synaptic plasticity** is the ability of synapses to strengthen or weaken over time, in response to increases or decreases in their activity.

Cognition is the use of conscious mental processes.

Hypothalamus is a small part in the brain that controls things such as body temperature and the release of hormones, that is below the thalamus.

Hippocampus is a part of the brain that is part of the limbic system and is important for memory.

Amygdala is one of two parts of the brain that affect how people feel emotions, especially fear and pleasure.

Encephalization is an evolutionary increase in the complexity or relative size of the brain, involving a shift of function from non-cortical parts of the brain to the cortex.

Docosahexaenoic acid (DHA) is an omega-3 fatty acid that is a primary structural component of the human brain, cerebral cortex, skin, and retina.

Linoleic acid a polyunsaturated fatty acid present as a glyceride in linseed oil and other oils and essential in the human diet (omega-6 fatty acid).

3. Translate the text into Russian and then back into English; compare your version with the original.

SYNAPTIC PLASTICITY

"Brain plasticity refers to the capacity of the nervous system to change its structure and its function over a lifetime, in reaction to environmental diversity. Although this term is now commonly used in psychology and neuroscience, it is not easily defined and is used to refer to changes at many levels in the nervous system ranging from molecular events, such as changes in gene expression, to behavior."

Neuroplasticity, or neural plasticity, allows neurons to regenerate both anatomically as well as functionally, and to form new synaptic connections. Brain plasticity, or neuroplasticity, is the ability for the brain to recover and restructure itself. This adaptive potential of the nervous system allows the brain to recover after disorders or injuries and to reduce the effects of altered structures due to pathologies such as Multiple Sclerosis, Parkinson's disease, cognitive deterioration, Alzheimer's, dyslexia, ADHD, insomnia, etc.

When engaged in new experiences and learning, the brain establishes a series of neural pathways. These neural pathways, or circuits, are routes made of inter-connecting neurons. These routes are created in the brain through daily use and practice; much like a mountain path is made by daily use of a shepherd and his herd. The neurons in a neural pathway communicate with each other through connections called synapses, and these communication pathways can regenerate throughout your whole life. Each time that we gain new knowledge (through repeated practice), the synaptic communication between neurons is strengthened. A better connection between the neurons means that the electric signals travel more efficiently when creating or using a new pathway. For example, when trying to recognize a new bird, new connections are made among specific neurons. Neurons in the visual cortex determine its colour, the auditory cortex identifies its song, and other, the name of the bird. In order to know what bird it is, its attributes, its color, song, and name are repeated many times. Revisiting the neural circuit and re-establishing neuronal transmission between the implicated neurons at each new attempt enhances the efficiency of synaptic transmission. Communication between the relevant neurons is facilitated, cognition made faster and faster. Synaptic plasticity is perhaps the pillar on which the brain's amazing malleability rests.

4. Use the title of the article to predict what it will be about – the topic. Skim the text. How close were your predictions?

BRAIN FOODS: THE EFFECTS OF NUTRIENTS ON BRAIN FUNCTION

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Abstract

It has long been suspected that the relative abundance of specific nutrients can affect cognitive processes and emotions. Newly described influences of dietary factors on neuronal function and synaptic plasticity have revealed some of the vital mechanisms that are responsible for the action of diet on brain health and mental function. Several gut hormones that can enter the brain, or that are produced in the brain itself, influence cognitive ability. In addition, well-established regulators of

synaptic plasticity, such as brain-derived neurotrophic factor, can function as metabolic modulators, responding to peripheral signals such as food intake. Understanding the molecular basis of the effects of food on cognition will help us to determine how best to manipulate diet in order to increase the resistance of neurons to insults and promote mental fitness.

Although food has classically been perceived as a means to provide energy and building material to the body, its ability to prevent and protect against diseases is starting to be recognized. In particular, research over the past 5 years has provided exciting evidence for the influence of dietary factors on specific molecular systems and mechanisms that maintain mental function. For instance, a diet that is rich in omega-3 fatty acids is garnering appreciation for supporting cognitive processes in humans and upregulating genes that are important for maintaining synaptic function and plasticity in rodents. In turn, diets that are high in saturated fat are becoming notorious for reducing molecular substrates that support cognitive processing and increasing the risk of neurological dysfunction in both humans and animals. Although these studies emphasize an important effect of food on the brain, further work is necessary to determine the mechanisms of action and the conditions for therapeutic applications in humans.

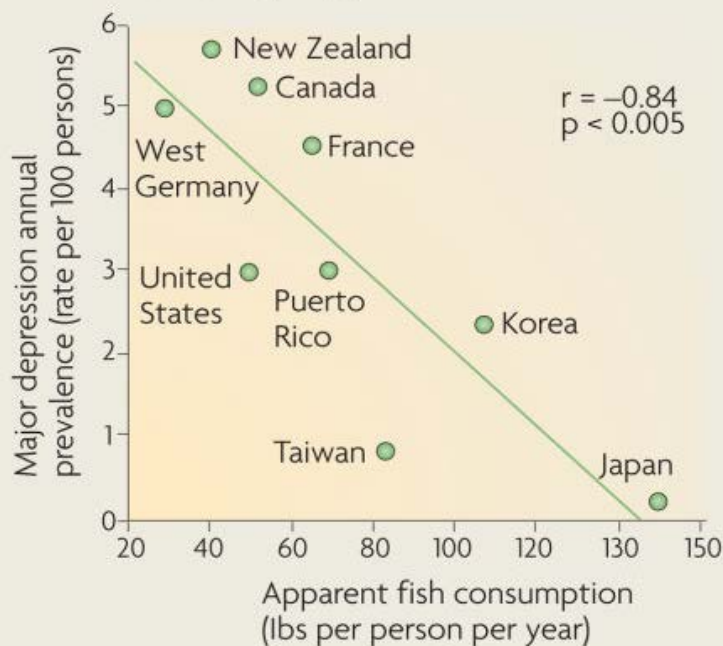
Over thousands of years, diet, in conjunction with other aspects of daily living, such as exercise, has had a crucial role in shaping cognitive capacity and brain evolution (BOX 1). Advances in molecular biology have revealed the ability of food-derived signals to influence energy metabolism and synaptic plasticity and, thus, mediate the effects of food on cognitive function, which is likely to have been crucial for the evolution of the modern brain. Feeding habits have been intrinsically associated with the development of human civilization, as people's choice of what to eat is influenced by culture, religion and society. The newly discovered effects of food on cognition are intriguing for the general public, as they might challenge preconceptions, and they attract substantial interest from the media. The fact that feeding is an intrinsic human routine emphasizes the power of dietary factors to modulate mental health not only at the individual level, but also at the collective, population-wide level. Here I discuss the effects of both internal signals that are associated with feeding and dietary factors on cell metabolism, synaptic plasticity and mental function. Throughout I use the term cognition from a neurobiological perspective, to refer to the mental processes that are involved in acquiring knowledge and to the integration of these processes into the conscious aspect of emotions, which influences mood and has psychiatric manifestations.

a

Cognitive skills
DHA

**b**

Contemporary fish consumption versus major depression



Box 1

Feeding as an adaptive mechanism for the development of cognitive skills

Adaptations that facilitated food acquisition and energy efficiency exerted strong evolutionary pressures on the formation of the modern brain and the energy-demanding development of cognitive skills. For example, the wildebeest annually travels hundreds of miles to find feeding grounds in the savannah, a behaviour that requires fully operational and complex navigational, defensive and cognitive conducts for survival. The function of brain centres that control eating behaviour is integrated with those of centres that control cognition. For instance, animals that eat a potentially poisonous meal develop a perpetual aversion to its flavour through complex mechanisms of learning and memory that involve the

hypothalamus, the hippocampus and the amygdala. In turn, pleasant memories of foods have been related to brain pathways that are associated with reward.

Abundant paleontological evidence suggests that there is a direct relationship between access to food and brain size, and that even small differences in diet can have large effects on survival and reproductive success. Larger brains in humanoids are associated with the development of cooking skills, access to food, energy savings and upright walking and running; all of these features require coordination with cognitive strategies that are centred in successful feeding. Dietary consumption of omega-3 fatty acids is one of the best-studied interactions between

food and brain evolution. Docosahexaenoic acid (DHA) is the most abundant omega-3 fatty acid in cell membranes in the brain; however, the human body is not efficient at synthesizing DHA, so we are largely dependent on dietary DHA. It has been proposed that access to DHA during hominid evolution had a key role in increasing the brain/body-mass ratio (also known as encephalization) (see figure, part a). The fact that DHA is an important brain constituent supports the hypothesis that a shorebased diet high in DHA was indispensable for hominid encephalization. Indeed, archeological evidence shows that early hominids adapted to consuming fish and thus gained access to DHA before extensive encephalization occurred. The interplay between brain and environment is ongoing. Over the past 100 years, the intake of saturated fatty acids, linoleic acid and *trans* fatty acids has increased dramatically in Western civilizations, whereas the consumption of omega-3 fatty acids has decreased. This might explain the elevated incidence of major depression in countries such as the United States and Germany (see figure, part b).

Internal signals and cognition

The influence of visceral signals on mental function has been appreciated since ancient times, and to this day lifestyle factors, such as diet and exercise, are used as part of therapies to reduce depression, schizophrenia and bipolar disorders. In this section I discuss the influence of vagal nerve stimulation (VNS) and gut hormones on cognition and emotion.

Effects of vagal nerve stimulation on cognition

Vagal afferents from the gastrointestinal tract are critical for monitoring various aspects of digestion, such as the release of enzymes and food absorption. The use of VNS has become a routinely approved procedure for the treatment of refractory partial-onset seizures. Based on observations that the application of VNS to patients with epilepsy was associated with improved mood, VNS was perceived as a potential treatment for depression. In humans, VNS failed to produce improvements in depression patients who participated in a short-term open trial (lasting 10 weeks); however, in a longer-term study (lasting 12 months), VNS produced beneficial effects that were sustained after 2 years. Specifically, patients treated with VNS doubled their improvement per month in the Inventory of Depressive Symptoms self report relative to patients receiving treatment as usual (TAU) by itself. TAU consisted of managing treatment-resistant depression with medication or with another therapy that was deemed appropriate by the treating physician. Based on the results of the long-term studies, the US Food and Drug Administration recently approved the use of VNS for the treatment of chronic (not acute) resistant depression. Although the mechanisms that underlie the effects of VNS on depression are not well-understood, a recent study demonstrated that VNS increases the levels of the mRNAs for brain-derived neurotrophic factor (BDNF) and fibroblast growth factor 2 (FGF2) in the rat hippocampus and cerebral cortex, as well as the level of noradrenaline in the

prefrontal cortex. As elevations of BDNF and noradrenaline have been associated with the effects of antidepressant treatments, these findings provide insights into how signals derived from the gut can affect mood. Furthermore, on the basis that neurons of the dorsal motor nucleus of the vagus nerve retrogradely transport BDNF and other neurotrophins, it is likely that neurotrophins are involved in sensory and motor signaling from the viscera. Interestingly, a separate line of investigations indicated that the application of VNS to humans or rodents enhanced memory performance, suggesting that the information that is signalled to the brain by the vagus nerve might serve to influence higher order cognitive processing.

Gut hormones associated with cognition

In addition to the capacity of the gut to directly stimulate molecular systems that are associated with synaptic plasticity and learning, several gut hormones or peptides, such as leptin, ghrelin, glucagon-like peptide 1 (GLP1) and insulin have been found to influence emotions and cognitive processes.

Leptin is synthesized in adipose tissue and sends signals to the brain to reduce appetite. Leptin receptors have been identified in several brain areas, including the hypothalamus, the cerebral cortex and the hippocampus. The fact that leptin elevates BDNF expression in the hypothalamus suggests that BDNF might mediate the effects of leptin on food intake and energy homeostasis. Like BDNF, leptin facilitates synaptic plasticity in the hippocampus. Genetically obese rodents with dysfunctional leptin receptors show impairments in long-term potentiation (LTP) and long-term depression and difficulties in spatial learning. These effects were rescued by administering leptin into the hippocampus. New studies showing that leptin promotes rapid changes in hippocampal dendritic morphology suggest that leptin exerts a direct action on hippocampal plasticity.

Ghrelin is an adipogenic hormone that is secreted by an empty stomach; it acts as an appetite stimulant in mice and humans. Ghrelin is the endogenous ligand of the growth hormone secretagogue receptor, which is expressed in the arcuate nucleus in the hypothalamus and in the hippocampus. Peripheral administration of ghrelin increases food intake in normal rodents and humans, whereas chronic administration can lead to adiposity. Ghrelin also promotes rapid reorganization of synaptic terminals in the hypothalamus, and in the hippocampus it promotes synapse formation in dendritic spines and LTP, which are paralleled by enhanced spatial learning and memory formation.

GLP1, which is synthesized by intestinal cells, regulates energy metabolism by stimulating pancreatic insulin secretion and subsequent glucose uptake by muscle cells, and by suppressing food intake through actions on the hypothalamus. GLP1 receptors are expressed in neurons, and infusion of GLP1 into the brain has been shown to improve associative and spatial memory in rats. Owing to their multiple

actions on somatic and neural targets, ghrelin, leptin and GLP1 can integrate processes that influence cognition and emotion.

Finally, insulin, which has classically been regarded as a gut hormone that is produced in the pancreas, has also been found to alter synaptic activity and cognitive processing. Insulin secretion is normally stimulated by the mental anticipation to meals and continues during digestion and the absorption of foods into the bloodstream. Insulin can enter the brain and interact with specific signal-transduction receptors located in discrete brain regions, such as the hippocampus. Overall, the evidence seems to indicate that the act of feeding can itself modulate cognitive processes on two levels, through neural circuits that connect the gut and the brain and through the release of gut peptides into the bloodstream.

Thus, as predicted from an evolutionary perspective, the gut does influence the molecular mechanisms that determine the capacity for acquiring new memories and that control emotions, as well as overall mental function. It is not surprising that visceral signals are now recognized as essential factors for the treatment of psychiatric disorders. The challenge now is to better our understanding of the molecular mechanisms by which peripheral signals can modulate mental processes.

(*Nat Rev Neurosci.* 2008 July; 9(7): 568–578. doi:10.1038/nrn2421)

Vocabulary notes

be notorious for – famous for something bad; пользующийся дурной славой, печально известный

wildebeest ['wɪl.də.bi:st] – a large African animal with a long tail and horns that curve to the sides that lives in areas covered in grass; антилопа

aversion [ə'vɜ:ʃ(ə)n] – a strong dislike of something; отвращение к чему-либо

refractory [rɪ'fræk.tər.i] – not affected by a treatment, change, or process; трудно поддающийся лечению

inventory ['ɪnvəntri] – a list of all the things that are in a place; опись, перечень

mRNA (messenger RNA) – матричная информационная РНК

retrogradely ['retɹəɡreɪdli] – обратно, регрессивно

viscera ['vɪs.ər.ə] pl – the large organs inside the body, including the heart, stomach, lungs, and intestines; внутренние органы

mediate ['mi:diət] – служить посредником, связующим звеном

impairment [ɪm'peəmənt] – the state of being impaired; повреждение

ligand ['liɡ.ənd] – a molecule (= the simplest unit of a chemical substance) that is attached to another molecule; лиганд

secretagogue [si'kri:tə,ɡɔɡ] – a substance stimulating the human pituitary gland to release excess growth hormone, стимулятор секреции

5. Give English equivalents for. Use them in sentences of your own.

Повышающая регуляция экспрессии генов, нейротрофический фактор головного мозга, жир с высоким содержанием насыщенных жирных кислот, прямохождение, электростимуляция блуждающего нерва (вагуса), афферентное (центростремительное) волокно вагуса, парциальный эпилептический припадок, фактор роста фибробластов, дорсальное моторное ядро, дугообразное ядро гипоталамуса, дендритные шипики, кровоток.

6. Give Russian equivalents for. Use some of them in sentences of your own.

To garner appreciation, to maintain function, food-derived signals, feeding habits, visceral signals, gastrointestinal tract, cerebral cortex, provide insights into, adipose tissue, to exert a direct action on, endogenous ligand, the growth hormone secretagogue receptor, signal-transduction receptors.

7. Give English equivalents of the following phrases. Use them in sentences of your own.

Приступить к изучению; сделать решающий вклад; происходить самопроизвольно; высказать догадку на основе эксперимента; выдвинуть гипотезу; оспаривать какую-либо точку зрения; быть знакомым с чем-либо (кем-либо); объяснять что-либо; кажется вероятным; быть обязанным кому-либо за что-либо; предмет исследования; невооруженным глазом; поразительные наблюдения; удовлетворить любопытство.

8. The following words can be used in a number of different ways. Write sentences exemplifying three different uses for each of them.

Matter, pass, formed, cells

9. A. Remember the plural of nouns of Latin and Greek origin:

species – species – вид, род, разновидность

analysis – analyses – анализ

nucleus – nuclei – ядро

stimulus – stimuli – возбудитель, стимул

genus – genera – род, сорт, вид

phenomenon – phenomena – явление

datum – data – данные

maximum – maxima – максимальная величина

alga – algae – водоросли (морские)

bacterium – bacteria – бактерия

medium – media – среда

stoma – stomata – устьице

bacillus – bacilli – бацилла
focus – foci – центр, фокус

B. Form the plural of the following nouns:

stimulus, nucleus, century, woman, goose, city, fish, toy, property, phenomenon, tooth, activity, genus, datum, nucleus, alga, bacterium, process, theory, box, medium, boundary.

10. Translate the following sentences, paying attention to the meaning of the words of Greek and Latin origin.

1. In order to avoid meaningless controversy over organisms which are clearly on the border line between plants and animals, and in order to recognize the diversity of the many microbial groups, it is convenient to set aside a separate kingdom for the microorganisms, divided (as will be explained below) into 13 divisions of equal rank; protozoa, fungi, slime molds, bacteria, rickettsia, viruses, and 7 divisions collectively known as "alga".

2. On this basis, the algae may be divided into 7 phylogenetic groups or "divisions". (The term, "division" is the botanical equivalent of the zoologist's "phylum").

3. One of the fundamental characteristics of all organisms is that they respond to stimuli.

4. The data from the experiment are summarized in Table 4.

5. A layer of tissue may be also called a stratum of tissue. There are many strata of cells and tissues that go to make up an organ. When we say that the skin is stratified, we mean that it is arranged in, or composed of strata or layers.

6. The student of animal physiology should pay attention to the physico-chemical basis of physiological phenomena.

11. Give as many synonyms to the following words as you can.

basic (3), main (3), permanent (2), nearly (3), entirely (2), generally (2), language (1), purpose (4), speed (3), get (2), use (2), continue (2), show (2), indicate (1), due to (5).

12. Translate the following adverbs into Russian. Use some of them in sentences of your own.

admittedly, prominently, fortunately, eminently, currently, entirely, lately, largely, subsequently, presumably, shortly, superbly, readily, hardly, nearly, namely, highly, fairly, scarcely, badly.

13. Explain the meaning of the following prefixes and translate the words into Russian.

mis– – mislead (v.), misprint (n.), misspell (v.), misunderstanding (n.);
out– – outdo (v.), outstanding (a.), output (n.), outside (adv.);
pre– prehistoric (a.), pre-establish (v.), preface (n.), precursor (n.);
sub– – subtropical (a.), subconscious (a.), subdivide (v.), subsoil (n.);
uni– – unicellular (a.), uniform (n.), unification (n.).

14. Make up key questions to the article.

15. Give the contents of the article in detail using your key questions.

16. Write a brief summary (15 sentences) of the article in English.

17. Make orally close to the text translation of the part Gut hormones associated with cognition.

18. A. Go to

<https://ed.ted.com/lessons/how-the-food-you-eat-affects-your-brain-mia-nacamulli> and watch a short TED-Ed talk on the role of nutrition and mental health given by Mia Nacamulli.

B. Answer the following questions:

1. What makes up the nutritional content of your brain?
2. Why is glucose important for brain health?
3. How do proteins and amino acids affect how we think and behave?

C. Choose the appropriate letter A–D

1. What is one thing that makes essential fatty acids so unique?
 - A. Essential fatty acids are man-made
 - B. Essential fatty acids must come from our diets
 - C. Essential fatty acids make you lose weight
 - D. Essential fatty acids come from saturated fats
2. Amino acids contain the precursors to neurotransmitters. Which of the following is a neurotransmitter?
 - A. Dopamine
 - B. Norepinephrine
 - C. Serotonin
 - D. All of the above

3. What do antioxidants do?
- A. Work as a natural pesticide for nutrient-rich fruits and vegetables
 - B. Shorten attention span
 - C. Activate neurotransmitters
 - D. Fight off free radicals that destroy brain cells
4. Most of the energy that your brain uses comes from:
- A. Antioxidants
 - B. Carbohydrates
 - C. Amino Acids
 - D. Micronutrients
5. Which of the following foods has slow glucose release?
- A. Legumes
 - B. Fruit
 - C. Dessert
 - D. Carbonated drinks

19. Write down some words or expressions from the video to remember. Compare with your partner.

20. Questions for discussion:

- 1. What do you think is an ideal diet for brain health?
- 2. How does this diet benefit the brain?

SUPPLEMENTARY MATERIAL FOR GRAMMAR REVISION

ACTIVE VOICE

21. Insert the correct tense form instead of the Infinitive.

YELLOW GLOW OF MYSTERY

In 1895 Wilhelm Konrad Roentgen, a professor who (to have been teaching) science for 20 years, (to be working) on the problems of electricity.

He (to be astounded) to see, there in his laboratory, lying about three feet away from the experiment on which he (to be working), a piece of paper that (to seem) to give of its own yellow-green glow of light.

There (to be) nothing on or near the paper to make it glow.

Alone there in his quiet, darkened laboratory, Prof. Roentgen (to try) to find the answer to the mystery, and finally (to write) in his notebook: "This (to be) a new kind of invisible light".

For Roentgen it (to be) a crossroads: should he continue with his work on electricity, or try to find out more about this phenomenon.

He (to decide) he must first name these mysterious rays, and since he (know) nothing about them he (to decide) to call them X-rays.

By the end of that year Prof. Roentgen (to have written) a report on his discovery that he (to entitle), "On a New Kind of Rays" – and as proof he (to have) the first X-ray photo taken of the human body – a picture of the structure of his own hand.

In "Secret of the Mysterious Rays" Vivian Grey (to tell) the fascinating story of Roentgen's work, and now it (to lead) on to the even more exciting discoveries of Becquerel, of Marie Curie-Sklodowska and her husband Pierre, of the great Einstein, of our own Ernest Rutherford, of Neils Bohr, of James Chadwick, and those great scientists and fighters for peace Irene and Frederic Joliot-Curie.

Through their work, man (to have learned) many of the secrets of the atom—secrets he (to have put) both to good and bad use.

Whatever we think of their application the story of their uncovering (to be) of immense interest.

(From *Morning Star*)

PASSIVE VOICE

22. Translate the following sentences into Russian.

1. Probably all nations and tribes have given names to plants, each in its own language. Such terms are learned in childhood and handed from generation to generation.

2. The regulation of division of mammalian cells in tissue culture is effected by a complex balance of signals reaching the cell surface.

3. The changes in the skin temperature of the newborn are a phenomenon of the same type which is affected also by external temperature and humidity.

4. Changes in the skin temperature curve of the newborn in the immediate postnatal period were followed in an earlier study.

5. In certain trypanosoms the blood phase is produced by invasion of microphages or their cells in the skin at the site of the bite and is followed by still another type of existence, after entry into the muscle cell of the heart.

6. Systematic botany should be preceded by a course in general botany, without which the student will fail to grasp the fundamental principles of phylogenetic taxonomy and will find that the examples used are mostly unfamiliar and meaningless.

7. When the diffusion takes place through a membrane, the process is known as osmosis. By this process, the water from the earth diffuses through the walls of the

cells in the root hairs. The intake of water is aided further by process of transpiration in the leaves.

8. The cell wall is often erroneously spoken of as the osmotic membrane, but it is usually as porous as to be freely permeable to water and substances in solution.

9. The great bulk of the cases of mimicry remained unnoticed, and the subject was looked upon as one of the inexplicable curiosities of nature, till Mr. Bates studied the phenomenon among the butterflies of the Amazon, and, on his return home, gave the first rational explanation of it.

10. Conditions which are comparable to these in the temporary ponds just described are met with in some habitats of bilharzia snails in East Africa. In certain places a pool which contains water perennially is surrounded by an area which is flooded each rainy season.

11. In the most common procedure, use is made of a specially constructed hydrometer placed in a tall cylinder containing a sample of the soil in a state of complete suspension.

12. Care must be taken in handling radio-active materials as painful and even dangerous burning may result from prolonged exposure to the rays.

13. Frequent mention is made by travelers in Southern Asia and the adjacent islands of a little fish called the Archer fish. It swims at the surface of the water and catches the insects on which it feeds by shooting a spray of water at them as they sit on the overhanging leaves or grass. It is wonderfully accurate up to a distance of two feet.

14. The origin of the race of men who made the Nile valley the cradle of civilization is still being sought by scholars.

15. The facts and principles to be discussed in this book have been determined by hundred of biologists working through the years. It is customary to say that a lot of facts and principles have been arrived at by the scientific method. But what is the scientific method? Actually there is no single method.

MODAL VERBS + PERFECT INFINITIVE

23. *Read and translate the following sentences, paying attention to the combination*

1. Everyone must have noticed the extraordinary effect upon insects when a passing cloud covers the sun. The drop of temperature slows down their movements or actually stops them altogether. The return of the sun starts them off at high speed once more. It is worthwhile to watch a big ant-hill under such conditions. In the sun the whole place swarms with hurrying ants, carrying sticks, caterpillars or each other, with restless energy. When it gets suddenly cooler they all stop working fast and do everything with painful slowness.

2. Any soluble manure or fertilizer that may have been applied over the surface of the field is likewise carried away in the runoff in solution or suspension.

3. The earliest livestock keepers who followed their herds could have been to a considerable extent nomadic.

4. The carotene fractions from both light- and dark-grown plants were separated from other components by chromatography of a petroleum ether solution on a sucrose column. The carotene moved down the column as a single orange band, with no resolution occurring. Alpha-carotene, which should have been detected by this procedure, was apparently lacking.

5. One of us is a geneticist by training, the other is a biochemist. The geneticist is inclined to let reproductive processes take the normal course and then, by analyzing the progeny, to deduce the molecular events that must have occurred with the organism. The biochemist is eager to break the organism open and search among the remains for more direct clues to what is going on inside. For our current task a synthesis of these two approaches have proved to be most fruitful.

6. Wesenberg-Lund and Rousselet have opened that "Victorella" is a marine genus, which recently has migrated to "fresh" water, a view which has been supported by Loppens. But, Braem, after considering the fact that the genus Victorella contained species described from such inland localities as Issyk-Kul in Central Asia, believes that members of the "Pavida" group could not have immigrated in the way suggested by Wesenberg-Lund and others. Braem thinks that "Victorella" is a typically brackish water genus.

7. The development of this disease must have been considerably favoured by high moisture conditions.

THE FUNCTIONS OF SOME VERBS

24. Analyse the meaning of the verb to have in the following sentences and translate them into Russian.

1. Still less is known about the function of the rootlet fibers. From the fact that some fully functioning cilia do not have a rootlet fiber, we judge it to be of secondary importance. There is no lack of guesses as to its purpose, but so far there is little argument.

2. It should always be remembered that the professional geologist has to rely, and always will have to rely, for a great many of his data, upon observations of men like fisher men, gamekeepers, local naturalists, and in fact, all manner of people who are not professional scientists at all.

3. A significant advance in the understanding of the processes that lead to acute thrombosis has been made by two physiologists from the Medical Research Council's

Thrombosis Group at Royal College of Surgeons. They have found that the growth of a thrombus depends critically on the rate of flow of blood in the veins.

4. It may be that in other cases both kinds of heterogeneity have to be taken into account.

5. When Mendeleev was constructing his table, it was obvious that several gaps should be left in order to have the succeeding elements fall into their proper groups.

6. The apparatus must of course be so constructed, that parts, such as the column, which may have to be interchanged, can be easily reached.

7. Among the chief agencies of dispersal are wind, water, animals and man. There are also many mechanical devices of the plant itself by means of which seeds are thrown short distances. The advantages of these natural means of dispersal seem slight when measured in a single generation, but they have a distinct significance when operating over centuries.

25. Analyse the meaning of the verb to be in the following sentences and translate them into Russian.

1. Enzymes are elaborated by cells, but their action is independent of life processes and they are not consumed in the course of their action. They occur in all tissues, particularly in digestive secretions, and they are of great importance for cellular processes in the digestion and utilization of food.

2. As the aim of the investigation was to study the influence of the concentration of free CO₂ under conditions similar to those previously used in most experimental work, such a procedure was obvious.

3. Though much has been learnt by man about the different aspects of natural history, there is far more to be discovered.

4. To measure the speed of blood flow they formed a small clot a short distance upstream from the site where the main clot was to be formed. When the upstream was small but clearly visible they stopped adding the adenosine triphosphate. The clot stopped growing and broke away. By filming its progress down the venule Dr. Begent and Dr. Born were able to calculate the rate that the blood was flowing.

5. The primary function of the central nervous system is not simply to regulate the functioning of different parts of the organism in relation to one another, but to regulate the functioning of the organisms as a whole in relation to its surroundings.

6. Some elements in the nervous system are capable of regeneration, others are not, so regions of nervous tissues, when destroyed, cannot regenerate and their functions are lost to the body.

7. Most species of mites are so tiny that a magnifying glass is of great help in detecting their presence. If one is available, collect a small branch of the plant suspected of having mites and tap it vigorously onto a piece of white paper or

cardboard. If mites are present, they will fall on the paper and will be plainly visible as tiny, moving specks against the white background.

8. The purpose of the lecture is to interpret the results of significant scientific research to the nonspecialists.

9. If gene action consists in part in directing the synthesis of specific large molecules, like proteins, it is to be expected that gene mutation would often be expressed in modification or abolishment of enzyme activity. In a number of instances this expectation has been realized.

26. Analyse the meaning of the verb to do in the following sentences and translate them into Russian.

1. Nevertheless, subsoil temperature does affect the behaviour and functioning of roots and may have an important bearing on plant growth.

2. Many creatures have larger and more elaborate eye structure than does man, but these more efficient eyes are always connected to much simpler brain.

3. Only now do we understand the importance of this discovery.

4. It was shown how the cell captures chemical or I energy and how this energy is used in biosynthetic readier. How does the cell use these small molecules to make the nucleic acids, protein, and saccharides which characterize it?

5. We do insist on the experiment being made at the earliest possible opportunity.

6. Moving water does both good and bad work. Floods, tidal waves and cloud-bursts are ways in which water does harm. It does good when it drives water-wheels.

7. Aid from an Ancient Animal

8. Though motorists who must swear to avoid hitting them on roads throughout the Southwest may think otherwise, armadillos (броненосцы) do have their uses. The little armored anteaters are edible, and their shells can be used to make novelty items, like bowls and baskets. Now it seems that these primeval-looking animals may get a role in man's efforts to cure an ancient disease. Researchers at the Gulf South Research Institute in New Iberia believe that armadillos may be ideal test animals for leprosy research.

27. Analyse the meaning of the verb should in the following sentences and translate them into Russian.

1. One should not forget that the hardiest varieties of alfalfa are often heavily damaged when grown under high humid conditions.

2. It is, therefore, clear that if other butterflies in the same region, which are eatable and suffer great persecution from insectivorous animals, should come to resemble any of those uneatable species so closely as to be mistaken for them by their

enemies, they will obtain thereby immunity from persecution. This is the obvious and sufficient reason why the imitation is useful, and therefore why it occurs in nature.

3. The question whether salts devoid of fixing properties should be added to fixatives to prevent changes due to osmotic pressure is still very obscure.

4. We should like to stress once more that our model rests on some unproven assumptions.

5. Anyone who grows primroses in the garden may find one or two flower buds already showing. There never seem to be more than one or two until the flowering season in March and April. Primroses use quite a lot of water, but over-watering makes the roots rot, then the plant soon begins to look unhealthy. They should not be kept in full sun, as they normally grow in shady places.

6. It should be remembered that only a relatively small portion of water taken in by the plant is used in food manufacture, for much the larger part soon leaves the plant again, passing out of the leaf into the air by transpiration.

7. The agronomist said that we should substantially increase the yields of this valuable farm crop.

8. Studies of drug toxicity and drug metabolism should take into consideration the capacity of human beings and higher animals to adapt themselves to drugs by a decreasing sensitivity of the receptor site in the organism or by accelerated breakdown of the active agent.

9. Soft-bodied fruits often burst after a series of rainy days but leaves should not as they have water pores.

10. Should there be no free movement of air in the soil, the plant growth would be markedly reduced.

11. In our country whatever institute you should graduate from, you will always get a job in your speciality.

12. If we imagined the behaviour of extra-vascular macrophages in the loose connective tissue, we should easily understand why they are called "big eaters": they devour and digest their own kind and other blood cells.

13. It should be pointed out that heredity and evolution are important in the development of the structure of an organ.

14. If corn is grown for grain, three important factors to consider are: quality of the grain, yield and size of ear. In as much as all three factors are affected by the rate planting, it is important that proper planting rate should be used.

15. Vitamin D is a miracle substance. It should be administrated either in the form of food vitamins or of vitamin producing sunlight. But overexposure of the body to sunlight has its dangers too. An intelligent person needs only observe the warning of nature.

28. Analyse the meaning of the verb would in the following sentences and translate them into Russian.

1. Life probably began in the sea and some at least of the earliest organisms are likely to have been minute free-floating forms which were able to absorb and use light energy to build up their bodies from simple inorganic substances, and which would therefore be classed as plants. Of these some developed flagella and became actively free-swimming, and their descendants are still represented by unicellular plants living in the sea or in fresh water.

2. Ideally one would like to study the intracellular enzymes in their natural environment by recombining isolated enzymes and the gel-like or matrix environment with which they are normally associated inside the cell, but progress in this direction is beset with many difficulties.

3. We try to solidify this substance but it would not, for the pressure was too low.

4. It was clear that dry ice would gain wide application in refrigerating industry.

5. As it would be expected, algae are most abundant in the upper soil horizons where environment conditions are most favourable for their development.

6. The cell wall is important, however, in giving mechanical support to the plasma membrane, thus enabling it to maintain much greater pressures than would otherwise be possible. The relation of the cell wall to the plasma membrane is, in this respect, much like that of the casing of an automobile tire to the inner tube.

7. A plant might have all reserve food material in a soluble form all the time, and this would be advantageous when quick results from food were needed.

8. If it were not for radioactivity, today's chemists would be limited, as were of past centuries, to guessing at what these chemical products are, and then trying to make in the laboratory the products they imagined. The early chemists who tried this guessed wrong. With the production in recent years of different isotopes of the chemical elements, it is now possible to follow reactions in living tissues and find out what is really happening there.

9. It was assumed, therefore, that any soil showing less than that amount of available potassium would need more than 100 pounds KCI per acre annually and any soil showing more would need less quantity. It is on this basis that the calculations shown in Table 87 were based.

10. Lomonosov attached great importance to his investigation in physics. "Poetry is my pleasure, physics is my exercise", he would say.

11. The plants described in the preceding chapters nearly all live in water. They are simple and primitive types. They may be perfectly fitted to their submerged existence and at least reasonably well suited or they would not continue to exist.

Except for a few degenerates, plants of a high degree of organisation are not found growing under water.

12. Formerly weather forecasts would base almost exclusively on data secured from the air close to earth.

13. Comets are rarely seen in the sky. It is only when they are fairly near to the earth that we see them. No account of the solar system would be complete without mention of comets, for these are just as much members of the sun's family as are the major and minor planets.

14. Several days would be required following a rain for root growth to be resumed.

15. One ingenious engineer who liked to keep his windows open whenever possible developed an automatic mechanism which would close the windows when it rained.

16. It would be highly desirable to have quantitative data involving kinetically controlled reactions.

17. As a result of considerations of structural organic chemistry one would expect to obtain important information regarding the compounds.

18. In this paper we would like to report on the nature of the physical linkage of the 5s rRNA genes to 16s and 23s rRNA genes, and to discuss the possible arrangement of the rRNA genes in bacteria.

19. Were there no loss of energy by friction, the motion would continue indefinitely once it had been started.

20. If soil were the determining factor, we would expect the highest crop at the beginning of the trials, rapidly dropping off to a steady level for later trials. Examination of the figures show that this was not so.

UNIT 4. GENETIC ENGINEERING

1. Practice the following for pronunciation and define them.

genetically engineered /dʒəˌnet.ɪ.kəl.i en.dʒɪˈnɪəd/

genetic engineering /dʒəˌnet.ɪk en.dʒɪˈnɪə.rɪŋ/

genetically modified organism /dʒəˌnet.ɪ.kəl.i ˈmɒdɪfaɪd ˈɔː.gən.ɪ.zəm/ (GMO /ˌdʒiː.əmˈəʊ/)

splice /splaɪs/

recombinant DNA /riːˈkɒm.bi.nəntˌdiː.enˈeɪ/

recombination /ˌriː.kɒm.biˈneɪ.ʃən/

clone /kləʊn/

cloning /ˈkləʊ.nɪŋ/

transgenic /trænzˈdʒen.ɪk/

transgenics /trænzˈdʒen.ɪks/

2. Compare your definitions with the given below. Translate them.

Genetic engineering is genetic manipulation.

Genetically engineered organisms are organisms whose cells have been genetically modified.

An organism altered in this way is a **genetically modified organism** or GMO.

DNA segments from one organism may be inserted or **spliced** into the DNA of another perhaps unrelated organism to produce genes that don't occur in nature in a process of recombination.

This is **recombinant DNA** technology.

A **clone** is a gene that has been isolated and copied or cloned in a process of cloning.

Clones are also complete organisms that have been produced by manipulating cells from an embryo to produce offspring with the same genetic make-up as each other.

Organisms that have been genetically manipulated and contain genes from other unrelated organisms are **transgenic**.

This activity is **transgenics**.

3. Translate the text into Russian and then back into English; compare your version with the original.

GENETIC ENGINEERING

Genetic engineering opened up tremendous possibilities for developing new plant varieties with built-in defences against pests and diseases. To date, more than 60 plant species have been genetically engineered.

If the emerging genetic engineering industry has its way, in the years ahead the world will see massive releases of genetically modified organisms into the environment.

Recombinant DNA techniques can splice a gene from one plant or animal into another. Using these methods, researchers have already produced a range of GMOs. There are potatoes with extra genes from bacteria; when fried, the potatoes make crisper chips. There is wheat that is resistant to herbicides, so the fields where it grows can be sprayed with immunity. There are tomatoes made frost-resistant by including genes from cold-water fish.

For the moment, cloning of human embryos is unlikely to be approved anywhere in the world.

The first gene was cloned – isolated and reproduced on its own in the laboratory – in 1972. At the time, scientists were so worried about the implications of what they were doing that they considered a voluntary moratorium on the recombination of cloned genes into the DNA of other organisms.

Some scientists who work on viruses oppose destruction because there may still be things to learn from studying smallpox. The World Health Organization says scientists have now produced harmless clones of the virus and have its full genetic blueprint.

Massachusetts scientists have genetically altered a herd of goats to produce anti-cancer proteins in their milk. The transgenic goats grew from embryos fitted with fragments of human DNA.

In developing countries, farmers may find the price of transgenics just too high. Worse, some could lose critical income as industrialized countries begin to grow genetically engineered crops to replace crops that are at present imported from the South.

4. Use the title of the text to predict what it will be about – the topic.

Skim the text. How close were your predictions?

NANO-FOOD

Willy Wonka is the father of nano-food, the great chocolate-factory owner, you'll remember, invented a chewing gum that was a full three course dinner. 'It will be the end of all kitchens and cooking,' he told the children on his tour – and produced a prototype sample of Wonka's Magic Chewing Gum. One strip of this would deliver tomato soup, roast beef with roast potatoes and blueberry pie and ice cream – in the right order.

Far-fetched? The processed-food giant Kraft and a group of research laboratories are busy working towards 'programmable food'.

One product they are working on is a colourless tasteless drink that you, the consumer, will design after you've bought it. You'll decide what colour and flavour

you'd like the drink to be, and what nutrients it will have in it, once you get home. You'll zap the product with a correctly-tuned microwave transmitter – presumably Kraft will sell you that, too. This will activate nano-capsules – each one about 2,000 times smaller the width of a hair – containing the necessary chemicals for your choice of drink: green-hued, blackcurrent-flavoured, with a touch of caffeine and omega-3, say. They will dissolve while all the other possible ingredients will pass unused through your body, in their nano-capsules.

The end of the cooking? Probably not. But nano-food and nano-food packaging are on their way because the food industry has spotted the chance for huge profits: according to analysts, the business will soon be worth \$20 billion annually. You'll first meet nanotechnology in food packaging. Most people have heard about the 'smart' food packaging that will warn when oxygen has got inside, or if food is going off – research on that is complete and the products are arriving. Samsung has fridges on the market in Asia and America that use nano-silver to kill bacteria. Also available in American supermarkets is cooking oil that, in theory, can be kept fresh for ever – thanks to nano-engineered molecules which lock onto contaminants. These could also simplify the process of cleaning drinking water – potentially hugely important for the developing world. In Australia, you can buy bread that contains undetectable nano-capsules of omega-3, a valuable nutrient found naturally in oily fish like salmon.

Food manufacturers including Unilever and Nestlé plan to use nano-encapsulation to improve shelf life and engineer taste sensations in fat based foods like chocolates, ice creams and spreads. There could be huge reductions in processed foods. Unilever believes it can reduce the fat content of ice cream from fifteen per cent to one per cent. In the future, atomic-level encapsulation techniques will get more sophisticated. A chef might decide that some flavours in his dish would only be released to the eater a certain number of seconds or minutes after chewing, or when they sip a glass of wine. Further ahead, the industry is looking at food that is pre-engineered to cater to your tastes, your dislikes and your allergies – or just built from scratch. Ultimately, it might be possible to create any meal you want at the push of a button, using nothing but plant proteins.

But Dr David Bennett, a veteran biochemist now working on a European Commission project on the ethics of 'nanobiotechnology', believes the public will almost certainly reject nano-food because of the perceived perils. 'Very little risk assessment has been done on this area, even on some products already entering the market'. What's to be afraid of, from a technology that offers so much – healthier food, fewer, better-targeted chemicals, less waste, 'smart' (and thus less) packaging, and even the promise of the technological solution to the problem of the one billion people who don't get enough to eat? 'Matter has different behavior at nano-scales,' says Dr Kees Eijkei from the Dutch Twente University. 'That means different hazards are associated with it. We don't know what these are.' For example, some metals will

kill bacteria at nano-scale – hence the interest in using them in food packaging – but what will happen if they get off the packaging and into us? No one seems to know.

The size question is central to these concerns. Nano-particles that are under 100 nano-metres wide – less than the size of a virus – have unique abilities. They can cross the body's natural barriers, entering into cells or through the liver into the bloodstream or even through the cell wall surrounding the brain. 'I'd like to drink a glass of water and know that the contents are going into my stomach and not into my lungs,' says Dr Oasim Chaudhry of the British Government's Central Science Laboratory. 'We are giving very toxic chemicals the ability to cross cell membranes, to go where they've never gone before. Where will they end up? It has been shown that free nano-particles inhaled can go straight to the brain. There are lots of concerns. We have to ask – do the benefits outweigh the risks?'

Vocabulary notes

to zap – cook smth in a microwave; готовить в микроволновке

hue (C) literary – colour; оттенок, тон

to lock onto – find smth and follow it closely; захватывать

to sip – drink taking only a small amount at a time; пить маленькими глотками, потягивать

to cater to sb/smth – give people exactly what they want, usually smth that people think is wrong; потворствовать, угождать

peril (formal) – extreme danger; опасность, риск

5. Give English equivalents for. Use them in sentences of your own.

Маловероятный (неправдоподобный), потребитель, питательное вещество, загрязнитель, испортиться, растворить, оказаться (достигать), упрощать, риск, беспокойство.

6. Give Russian equivalents for. Use some of them in sentences of your own.

Processed food, prototype sample, programmable food, huge profits, shelf life, encapsulation techniques, risk assessment, release flavours, plant protein, further ahead, undetectable, inhale, reject.

7. Rephrase and translate the following sentences. Remember that

instead of ...

presumably

ultimately

from scratch

matter

sophisticated

we can say...

probably

finally

from the beginning

substance

advanced

1. Presumably he just forgot to send the letter.
2. The disease ultimately killed him.
3. I lost all my notes so I had to start from scratch with the project.
4. As a result, the energy exchange between matter and radiation becomes less efficient.
5. At that time, genetic engineering techniques were not sophisticated enough to develop something substantial.

8. Choose the appropriate letter A–D

1. Which of the following does “programmable food” mean?

- A. Food taken at the exact time during the day
- B. The amount of food per meal
- C. The amount of meals per day
- D. Food with nano-capsules

2. Which of the following does “processed food” NOT mean?

- A. It goes through many complex manufacturing steps
- B. It is whole food
- C. It is not found in the nature
- D. It contains additives

3. Unlike ordinary packaging, “smart” packaging ____

- A. keeps food fresh permanently.
- B. prevents any oxygen from reaching the food.
- C. has yet to arrive on supermarket shelves.
- D. can monitor the condition of the food it contains.

4. Which of the following words best describes “sophisticated” techniques?

- A. alternative
- B. complicated
- C. experimental
- D. advanced

9. Translate the questions to the text and answer them.

1. Что общего между волшебной жевательной резинкой Вилли Вонка и разрабатываемыми в настоящее время нанопродуктами?

2. Какие свойства смогут выбрать (определить) потребители, приготавливая программируемые продукты в микроволновой печи?

3. Возможно ли сегодня найти продукты нанотехнологии в супермаркетах?

4. Что в будущем нанотехнологии сделают возможным для потребителей?
5. По мнению ученого Дэвида Беннетта как общественность отреагирует на нанопродукты?
6. Как размер наночастиц связан с их потенциальной опасностью?

10. Read the text and indicate the topic sentence in each paragraph. Then briefly develop the idea of each topic sentence.

11. Summarize the main points in the text. Write a plan of the text in the form of statements. Give a short summary of the text using active vocabulary (one third of the original length).

12. In your group discuss concerns about genetically modified food.

Why is something as common as GM food still controversial? The concerns about GM food generally fall into one of three categories: health concerns, social concerns and environmental concerns.

1. Health concerns: Is GM food safe for human consumption? Could GM crops increase bacterial resistance to antibiotics?

2. Environmental concerns: What effects will GM crops have on the level of use of pesticides? Can GM crops harm other organisms? Will GM crops become 'superweeds'?

3. Social concerns: Can GM foods reduce world hunger? Who is responsible if GM foods prove to be harmful to human or the environment?

13. Words with multiple meanings.

Read the dictionary entry of the word 'mean' and translate the sentences. Then make up sentences of your own.

mean n. – 1. середина	the golden mean – золотая середина
means pl. – 2. средство	by means of this – посредством этого
способ	by all means – во что бы то ни стало
	by no means – никоим образом
3. средства	private means – личные средства
mean v. – 4. значить	It means that – Это значит что ____
думать	I mean – Я имею ввиду, думаю
mean adj. – 5. плохой,	a mean man – подлый человек
скупой	

1. We have all means to produce good results in our work.
2. We improve soil structure by means of proper crop rotation.
3. By no means do all parts of a plant develop at the same time.
4. What does this word mean?
5. If the lecture takes place I'll come by all means.
6. Like some people you didn't understand the meaning of this work.
7. I thought my sister was being mean to me.
8. He is too mean to buy her a ring.

14. Give all possible variants and translate them into Russian.

general (biology, education, meaning, trends);

basic (assumptions, features, principles, subdivisions);

to do (experimental work, research in smth, theoretical studies on);

to make (a great contribution to, a discovery, an investigation on smth, observations, an experiment, a suggestion, a conclusion, a mistake, an approach, analyses, an abstract of, measurements);

to obtain (fresh-data, information, good results);

to gain (knowledge, recognition, experience).

15. Make an oral translation of the Russian text in the left column, translate one paragraph at a time and compare your version with the original in the right column. Then translate the English text. Discuss any inaccuracies and mistakes in your translations.

ДНК-компьютинг стал на один шаг ближе, так как в прошлом месяце ученым удалось построить первый программируемый компьютер, сделанный на основе молекулы, несущей генетическую информацию.

News last month that scientists had built the first programmable computer made from the molecule which carries our genes has brought the vision of computing with DNA one step nearer.

Идея следовать законам природы и использовать ДНК для хранения и обработки информации появилась в 1994 году, когда Леонард Адлеман из Университета Южной Калифорнии первым разрешил несложную математическую задачу при помощи пробирки с ДНК.

The idea of following Mother Nature's laws and using DNA to store and process information took off in 1994, when Leonard Adleman of the University of Southern California first used DNA in a test tube to solve a simple mathematical problem.

С тех пор более десятка исследовательских групп по всему миру работают в направлении, которое находится на стыке биологии и информационных технологий и сфокусировано на использовании специфических свойств цепей ДНК, способных выполнять триллионы параллельных вычислительных операций.

Знаменитая молекула с двойной спиралью, которая находится в ядре всех клеток, может содержать больше информации в кубическом сантиметре, чем триллион музыкальных компакт-дисков, при этом данные хранятся в виде кода соответствующего комбинации из четырех химических оснований – аденина, тимина, цитозина и гуанина (А, Т, С, G). Основания специфическим образом соединяются друг с другом (А с Т, G с С). В результате такого спаривания получаются цепи с комплементарными последовательностями, которые могут быть «прочитаны» при помощи натуральных ферментов, что позволяет ученым находить скрытые закономерности в сложных наборах данных.

Но возможность использования потенциала ДНК для создания микропроцессора остается все еще под вопросом, и многие ученые полагают, что ДНК-чипы будут скорее дополнять, нежели совсем заменят кремниевые микросхемы.

«Я думаю, в будущем мы могли бы построить гибридные машины, которые использовали бы в значительной степени традиционную кремниевую начинку для обычных вычислений и имели бы ДНК сопроцессоры для специфических задач», –

Since then a dozen research groups around the world have jumped into the field – which fuses biology and information technology – in a bid to harness the inherent ability of strands of DNA to perform trillions of calculations at the same time.

The famous double-helix molecule found in the nucleus of all cells can hold more information in a cubic centimetre than a trillion music CDs, with data stored as a code of four chemical bases – adenine, thymine, cytosine and guanine, or A, T, C and G. These chemical "letters" like to link up with particular other ones, which means strands with complementary letters stick together (A with T, G with C). These linkages can then be "read" using naturally occurring enzymes, giving scientists a way of finding hidden patterns in complex datasets.

But harnessing DNA's potential as a microprocessor remains a challenge and many scientists believe it will only ever complement rather than replace silicon-based computers.

"I think in the future we might have hybrid machines that use a lot of traditional silicon for normal processing tasks but have DNA coprocessors to take over specific tasks for which it is best

сказал Мартин Эмос, ассистент из Ливерпульского университета, который подготовил первую диссертацию в области ДНК-компьютинга.

suites," said Martyn Amos, a lecturer at the University of Liverpool who wrote the first Ph.D. in DNA computing.

Эмос уверен, что ДНК-компьютинг, остающийся пока на стадии экспериментов, может стать реальностью в ближайшие пятьдесят лет.

The whole field of DNA computing remains at the very early "proof-of-principle" stage but could start to become a reality in the next five to ten years, Amos believes.

16. Render the following texts in English (to render a text in English means to give a free translation; any passage presenting special difficulty for translating may be rephrased to convey the general idea).

ПОМИДОРЫ С ЖАБРАМИ

Противостояние сторонников и противников употребления генно-модифицированных продуктов можно назвать спором века. Так или иначе, но эти загадочные продукты-звери все больше проникают в нашу жизнь: якобы в будущем они смогут спасти прогрессивно растущее человечество от голода, ведь, обладая феноменальными свойствами, ГМП устойчивы к морозам, могут расти на целине и потом долго храниться. Однако воздействие трансгенов на организм человека до сих пор не изучено, что вызывает массу мистификаций.

Эксперименты по оснащению растений чужеродными генами начались в 70-е гг. прошлого века. Первыми были китайцы, которые научились выращивать устойчивый к пестицидам табак. Эстафету подхватили американцы, создавшие немнущиеся помидоры, удобные для транспортировки.

Сегодня в мире насчитывается порядка 50 растений, выращенных с помощью генной инженерии. Это, например, морозостойкие томаты с геном антарктической камбалы, картофель с геном бактерии, убивающей колорадских жуков, устойчивая к засухе пшеница с геном скорпиона, суперпитательный рис с женским человеческим геном, а также соя, баклажаны, яблоки, рожь, пшеница, капуста, свекла, рапс, клубника, огурцы, горох, кукуруза, хлопок и другие фрукты, овощи и культуры.

В России на выращивание генно-модифицированных растений и производство ГМП наложен запрет, но не запрещены ввоз и продажа таких продуктов из-за границы. Так, лидером по производству ГМП являются США: там 80% продуктов изготовлены с использованием генетически модифицированных ингредиентов. Даже в состав американского детского питания входит генно-модифицированная соя. Также к лидерам среди стран, питающихся ГМП, являются Канада, Китай, Австралия, Аргентина, Мексика и Уругвай.

К слову, генно-модифицированные ингредиенты входят в состав продукции известных транснациональных брендов. Среди них – Coca-cola, Pepsi Co, Nestle, Mars, Uncle Bens, Kellog's, Cadbury и другие. "Фаршированные" чужими генами фрукты и овощи не имеют специальной маркировки и отличить их от обычных помидоров и свеклы можно только в лаборатории. Трансгенная соя также часто входит в состав фастфуда: в дешевые гамбургеры редко кладут натуральную говядину. Единственный продукт, который ученые пока не научились модифицировать, это гречка.

СЪЕДОБНЫЙ ГЕН: МНИМАЯ УГРОЗА

Несмотря на то, что влияние ГМО на человеческий организм все еще остается загадкой, подавляющее большинство потребителей предпочитают такие продукты избегать. Прилавки магазинов наводнили колбасы, картофель и деликатесы с броскими наклейками "без ГМО". По мнению доктора биологических наук Андрея Каменского, трансгенов бояться – лучше вообще ничего не есть.

Как считает ученый, ГМП – неизбежность и за ними будущее. "Человечество растет в количестве с невероятной силой, а у нас только 10% занято так называемыми агроценозами. В России огромное количество земли, это так называемые зоны неуверенного земледелия. На них сей – не сей – большой урожай не получишь. И только генно-модифицированное что-то, холодоустойчивое или не боящееся плохих почв, даст результат", – уверен А.Каменский.

Что касается воздействия трансгенов на организм человека, то, как говорит эксперт, бояться не стоит, поскольку они не усваиваются. "Такой простой пример: зашел человек в комнату, с него сшелушивается несколько микрограмм кожи. В них целехонькое ДНК, и мы дышим его генами. А если человек с вами 10 лет в комнате: представляется, сколько вы от него набрались? И он от вас, привел пример ученый. Поэтому не превратились же мы друг в друга или в кошек: из них летит черт знает что".

В свою очередь противники ГМО (в основном Европа) считают, что трансгены, попадая в организм, хоть и не могут внедриться в геном человека, но свободно по нему "гуляют", что может привести к развитию разных заболеваний – от аллергий до опухолей и бесплодия. Кто-то и вовсе считает ГМО разновидностью биологического оружия. Иммунологи приводят сравнительную статистику: в Штатах, где модифицированные продукты продаются свободно, от аллергии страдают 70% населения, а в Швеции, где ГМО под строжайшим запретом, аллергиков в 10 раз меньше.

ВИНОГРАДНО-ЯБЛОЧНЫЙ ТАНДЕМ И ГИГАНТСКИЙ ИЗЮМ

Вопреки всем нареканиям специалисты генной инженерии продолжают свои эксперименты по «выведению» суперпродуктов будущего. Если подавляющее большинство из них в силу дешевизны и устойчивости к непогоде должны накормить человечество, то какие-то представляют только эстетическую ценность. Так, одной из последних разработок генной инженерии стало выведение нового фрукта – яблoграда. Гибрид представляет собой смесь яблока и винограда, на вкус напоминает и то и другое сразу, но размер остался от райского плода, а текстура – от винограда. Кому и зачем понадобился яблoград, если эти фрукты вкусны и полезны по отдельности, непонятно, но кто-то считает, что именно такой гибрид содержит необычайно много витамина С.

Еще одной сомнительной разработкой стало создание гигантского изюма, который впервые был получен в японском национальном Институте генетики. Сушеную ягоду "вырастили" из гигантского винограда путем изменения его генетического кода. Сытость приходит после пары таких изюминок.

<https://www.rbc.ru/society/31/05/2012/5703f84f9a7947ac81a68837>

GRAMMAR REVISION

17. Analyse and translate the following sentences (infinitive):

1. About three hundred years ago Robert Hooke found the acorn of the oak tree to be made of tiny compartments which he named cells. 2. To prevent the eyes from drying, most land vertebrates have well-developed eyelids which they blink many times each minute to keep the eyeball clear and moist. 3. One of the surprising features of the Arctic is the number of insects to be found there. 4. Dinosaurs were the first animals to fly. 5. Lizards are found to live everywhere in the world except the Arctic regions. 6. Bacteria seem to be nearly everywhere. 7. An organ is a group of tissues working together to do a certain job. 8. Most insects are known to have large compound eyes and often three or more simple eyes situated between the others. 9. The endocrine secretions have been found to control many of the organic functions. 10. Bacteria are known to live on either dead or living materia. 11. When conditions are favourable, some insects are known to produce a new generation in less than two weeks. 12. We know Michurin to have crossed not only different varieties of the same plant but different plants, for instance, apples and pears. 13. Dockutchaev believed plants to influence soil development. 14. We found the enzymes to have played an important part in the building of the complex substance from a simple one. 15. Earthworms help to keep soil porous, which allows air to penetrate to the roots of plants. 16. Prolonged irritation seems to cause some cancers. 17. Scientists consider each part of the nervous system to have a definite function.

18. Birds are said to be warm-blooded. 19. Everybody knows the nervous system to consist of many thousands of nerve cells or neurons. 20. Many other vitamins are known, but most of them have not yet been proved to be essential in human metabolism.

* * *

1. Proteins to be circulated must be digested into amino acids. 2. Since the functions of nerves in animals have long been known to involve electric phenomena it is not strange that scientists are beginning to look on the electric changes in plant cells as a type of nervous activity. 3. To establish the relationships of these acids two things must be taken into consideration. 4. Among other things Robert Hooke examined thin slices of cork obtained from the bark of a tree, and found it to be made up of little boxes which he called cells. 5. Undoubtedly there is a determining factor that causes each branch root to be sent forth from a definite point, but its nature is obscure. 6. The specificity of enzymes action is thought to be related to the properties of the enzyme protein. 7. In many instances the sex pattern of plants appears to be influenced more readily by environmental factors than does that of animals. 8. Enzymes are known to be present in the chloroplasts. 9. Enzymes are very sensitive to acids and alkalies and might be expected to start reverse activities when changes in acidity occur. 10. Scientists are agreed that life began in the sea, and blood is believed to have originated by sea water being enclosed within the body. 11. Movements of the air are known to increase evaporation from the leaves. 12. The power of bacteria to produce disease is known as virulence. 13. The first thing to be done in this case is to roll the soil after ploughing for firmness to be obtained.

18. Analyse and translate the following sentences (ing-forms):

1. Studying the complex biological phenomena manifested in hybridization, Michurin developed entirely new methods, not known before him either in biological science or in the practical work of plant or animal breeders. 2. We were surprised at his not being invited to the party. 3. I am grateful for your having invited me. 4. The presence of this toxin having been detected, the patient was injected with antitoxin. 5. We couldn't clear up some points in the report without asking some questions. 6. The stability of the compound being formed must be considered. 7. Hydrogen is the lightest substance known. 8. The flowers pollinated by flies are most often dark in colour. 9. Leaves on plants grown in darkness are very small. 10. There is a difference of opinion as to the amount of carbon taken from the soil by the roots of plants. 11. The possibility of demonstrating specific parts of the intestinal tract as being responsible for the intoxication seen in those animals was explored in two ways. 12. The leaves, having no growth tissue, are secondary structures. 13. Photosynthesis forms sugar which is temporarily changed to starch, this keeping down sugar concentration in the cell. 14. Any plant part used as food contains several

vitamins. 15. Leaves are born mostly at the tops of branches, the main limbs toward the trunk being devoid of them. 16. Botany-Zoology system grew up naturally as biologic science developed, the emphases during its early years being placed on structure and relationships. 17. The sources of materials used have been recorded elsewhere. 18. The theoretical treatment given is based entirely upon the experiment. 19. Before being planted, potatoes are cut into several pieces, each piece having at least one eye. 20. Unfortunately it is not possible to present in this book all the information obtained. 21. The size of microorganisms is usually expressed in microns, a micron being one thousandth of a millimeter. 22. Vertebrates known as fishes are widely distributed, being found in water in nearly all parts of the earth. 23. Having made a great number of experiments with different substances the chemists found that most of them could be decomposed into other substances. 24. The succession of plants during a single growing season illustrates the distribution of plants by temperature, the spring plant being able to endure greater cold than can those of the summer. 25. Plants grown in the dark are always colourless, chlorophyll becoming green only under the action of light. 26. Abundant water being combined with high temperature, luxuriant vegetation is the result. 27. My little sister dislikes being alone at home. 28. Not all water present in soil is capable of being drawn by the root of plants. 29. There is a possibility of his being sent to this conference. 30. In this figure you can see a diagram of recording. 31. After having checked the temperature twice he decided to change conditions of the experiment. 32. In some species the vessels may be of both large and small diameter, the large vessels being concentrated in the wood formed early in the growing season. 33. In many lower plants there is little organization and differentiation of the plant body, the individual cells being held together very loosely. 34. Birds have no teeth, the food being swallowed without chewing. 35. All primates resemble man to some degree, the resemblance being least marked in the monkeys. 36. Many birds thrive in the Arctic, the sea birds being more numerous than the land ones. 37. The frog is a cold-blooded animal, its temperature varying with the environment. 38. Children lacking sufficient vitamin C, their teeth frequently decay easily. 39. Cold-blooded forms possess no heat-producing or heat-regulating mechanisms, their bodies tending to take the temperature of the surrounding water. 40. Only the snakes have no eyelids at all, their eyes being fixed in a permanent glassy stare. 41. Whether a substance is an element or not could be determined by experimenting. 42. We insist on their taking part in this experiment. 43. During the experiment I needed recording temperature immediately.

ABSOLUTE PARTICIPLE CONSTRUCTION

19. Translate the following sentences into Russian. Point out the Absolute Participle Construction.

1. The fact having been established, the chemists began investigations in search of methods of extracting sugar from beets. But much time had passed before the manufacture of beet sugar was begun.

2. In certain species of the simpler bacteria, chiefly bacilli, spores are produced under adverse conditions. These spores are formed in the same way as yeast spores, by the aggregation of the protoplasm at a spot in the cell, the protoplasm of the spore being surrounded by a dense wall.

3. With frequent and thorough cultivation having been made, they succeeded in getting the highest possible yields of this crop.

4. The temperature having dropped to 40°F (forty degrees Fahrenheit), few ordinary plants will continue to grow since most of them require at least double this temperature for optimum growth.

5. The weak solutions produced by leaching of the rocks during the wet season thus become concentrated by evaporation, and dissolved materials are deposited, the least soluble being the first to be precipitated.

6. The action of mustard gas as a mutagenic agent was proved by Auerbach and Robson. The first positive result having been obtained, they tried a number of other compounds chemically related to mustard gas or analogies in some mode of physiological action.

7. In other air breathing forms the organs of respiration are tracheas, ramifying tubes which open on the surface, their finest branches extending in all parts of the body.

8. Man's body very plainly is patterned on the mammalian part. Part for part, his skeleton, musculature, nervous system and internal organs correspond to those of other mammals, identity of features being especially close between man and other primates.

9. Unlike the responses of photoperiodism, the response to cold treatment is strictly localized. If a tree which has become dormant is subjected to cold treatment of only stem alone, the rest of the plant remaining under high temperature conditions, it is found that the dormancy of only the treated stem is broken.

10. After cotton flowers open, a period of 45 to 70 days passes before the boll opens, with the length of time being determined by the variety, temperature, humidity.

11. In most biology text-books the entire living world is divided into two groups: "plants" and "animals". The microorganisms are somewhat arbitrarily divided between the two groups, the protozoa being classified as animals and the algae and fungi as plants.

COMPLEX OBJECT

20. Translate the sentences into Russian. Pay attention to Complex Object.

1. Chemical analyses show living materials to consist of carbon, hydrogen, oxygen, nitrogen, sulfur, phosphorus, potassium, iron and magnesium.
2. Mendeleev wanted those who look for new objects for research to study uranium compounds with particular care.
3. He made this reaction run at reduced pressure.
4. The chemists have found the blood plasma to be rich in food substances which are on their way from the organ of digestion to other places where they may be needed.
5. Intense chemical weathering caused soils to be more alike.
6. Scientists consider the air conditions of the soil to influence the course of organic matter decomposition.
7. We know flowering plants to be divided into three classes on the basis of photoperiodism.
8. After examining the undersurface of fern you find it to consist of sori (sorus – cоpыc).
9. This instrument enables measurements to be made much more accurate.
10. All force pumps in the heart are made with valves which allow the blood to go only in one direction.
11. Roentgen knew that the cathode rays make screen glow.
12. Here is the substance which he assumed to possess the properties required

COMPLEX SUBJECT

21. Translate the sentences into Russian. Pay attention to Complex Subject.

1. In 400 BC, when Hippocrates wrote a book claiming that epilepsy, the "sacred disease", was a natural disorder and not a visitation of demons, the science of biology may be said to have begun. Since then, curious naturalists have studied animals and plants, doctors have suggested answers to very practical questions. The science of biology has grown slowly at first, stopping and starting again, and building in the last century to a crescendo that has not yet reached its peak.
2. It is surprisingly to know that much of the activity of organisms is believed by biologists and psychologists to be more or less mechanical behaviour. All animals, from the Protozoa to the Vertebrates, including man, show simple types of mechanical behaviours that are called reflexes.
3. Free nerve terminations are held to be responsible for the reception of certain types of mechanical stimulation and they may be considered to be the origin of sensation and of pain.

4. Pavlov's principles of determinism, characterising the whole teaching on reflexes, can be said to have received the highest development in conceptions on the second signal system, this being the first step in the study of brain activity.

5. The height of a full-grown Giraffe in a wild state is said to be from seventeen or eighteen feet, measuring from hoofs to the top of the ears; but none of these in England exceed fourteen feet.

6. Laboratory animals, on a synthetic diet, have been found to benefit from the addition of potassium bromide to the food.

7. In this chapter we present a small selection of problems which are believed to constitute a representative sample.

8. The nucleic acids were first discovered in 1869 by a Swiss biochemist Friederick Miesher. They were so named because they were first detected in cell nuclei. Later, when they were found to exist outside the cell nucleus, too, it was too late to change the name.

9. Mineral weathering appears to proceed more rapidly in the vicinity of tree roots than at points where they are lacking.

10. This phenomenon does not appear to be studied.

11. The fertility of first crosses depends in part upon the constitution of the individuals which happen to have been chosen for the experiment.

12. There does appear to be some correlation between these data.

13. These important substances were called vitamins (Lat. "life amines"), on the supposition that they are amines (derivatives of ammonia) and are essential to life. The term proved to be rather poorly chosen, for, with the exception of the B group, the vitamins do not contain nitrogen, an element so essential to the amines.

14. Four main mechanisms for orientation of cell movement appear to be at work in vitro. They are: contact guidance, chemotaxis, contact inhibition, and associate movement. Some of the four mechanisms proposed may in the end turn out to be varieties of each other; but at present they seem to be sufficiently distinct categories for the purpose of analysis.

15. Although the fly does not appear to make much use of its extensive optical equipment, it likes and dislikes about colour. It is most attracted by red, with dusky blues as second choice.

16. Cool weather is likely to cause the development of a heavy root system.

17. The new method is apt to yield better results.

18. The cells of a living leaf need to be saturated with "water to remain alive and, except in the wettest of weather, are liable to lose it by evaporation.

19. The above mentioned reactions are certain to proceed smoothly.

20. This compound is sure to contain admixtures.

21. Cancer is one of the many illnesses which people are liable to suffer from as they grow older

UNIT 5. HEALTHIER FOOD FOR HEALTHIER PLANET

1. All these words you will find in the interview. Use the dictionary to get the meaning of unknown words of this list.

1. Health
2. Carbon footprint
3. Environment
4. Diet
5. Greenhouse gas emission
6. Guideline
7. Consumption
8. Inefficiency
9. Livestock
10. Ruminant
11. Measure
12. Cardiovascular disease
13. Cancer
14. Blood cholesterol level.

2. Listen to the interview and answer the following questions (Use this link to listen to the interview <https://www.thenakedscientists.com/articles/interviews/how-can-we-eat-healthily-and-sustainably>).

1. What industry produces 30% of the world's greenhouse gas emissions?
2. What is safer for the environment in terms of greenhouse effect to eat: meat based food or plant based food?
3. How does a lower meat diet influences people's health according to Cohort studies?

3. Listen to the interview once more and mark the statements as true (T) or false (F).

1. A lot of people realize that the food that they eat has a massive implication on greenhouse gas emission.
2. A diet low in meat and higher in plant is the best for the health of humanity and our planet.
3. In the UK a meat eating diet has about 50% more greenhouse gas emissions than a vegan diet.
4. Moving to a lower meat diet isn't associated with the reduction in body weight and in blood cholesterol levels.

5. Dietary greenhouse gas emissions aren't correlated with the amount of meat that you eat.

6. Diet is a good thing to talk about if you want to reduce your global carbon footprint.

4. Read the text of the interview and do the other tasks.

People often think about eating for their own health, but what about the health of the planet? What changes could we make to our diets that will also have an impact on our carbon footprint, particularly as the world population continues to grow? Georgia Mills put these questions to Peter Scarborough from Oxford University's Nuffield Department of Population Health, asking first how much of an impact do our food choices actually have on the environment?

Peter:

– Diet is a good place to start if you're looking to reduce your global carbon footprint. Not many people realise that the food that they eat has a massive implication on greenhouse gas emissions. In fact, in total 30% of the world's greenhouse gas emissions that are produced are from the global food systems.

Georgia:

– Can we juggle these ideas of being healthy and being sustainable at the same time?

Peter:

– We can, but there are some tensions. The classic one is fish, so the healthy advice for healthy eating is for everyone to eat two portions of fish a week, one of which is oily fish. If everyone in Britain actually met those guidelines, there'd probably be no fish left in the sea; that clearly works against sustainability.

There are ones that are the other way round as well. In sustainability terms it's best off if we eat all of the food that we produce. So things like sausages and other kinds of processed meat is very good for sustainability because you get cuts of meat that otherwise wouldn't be eaten and you wrap them up with salt and saturated fat to make them palatable, and they're not good for health. But the general message of being able to eat a healthy sustainable diet largely can boil down to one area and that is meat consumption. So if are eating a diet that is lower in meat, higher in plant based foods, then you're probably hitting something which is both healthier and better for the environment.

Georgia:

– I know it's an age old debate isn't it – should we be vegan, vegetarian, or continue to eat meat? What do the numbers say I guess?

Peter:

– In terms of the sustainability, we've known for a long time that greenhouse gas emissions related with plant based foods compared to meat based foods are far,

far lower – orders of magnitude lower. That’s particularly the case for ruminant meats, so that’s for cows and for sheep because that’s basically about the kind of processes that are involved in the way that meat is raised. When you’re talking about animal based products you’ve got inefficiencies in the system of raising livestock, which is about the fact that you have to feed animals with food that otherwise could have gone to human consumption.

Then you’ve also got natural systems with ruminants like methane production when cows burp and they fart. Essentially methane is about 25% times as high a greenhouse gas emission as carbon. So they all add up to a much higher greenhouse gas emissions for meat based foods than plant based foods.

The work that we’ve been looking at is to say let’s take a vegetarian diet and a vegan diet and compare it to a meat based diet, measure the greenhouse gas emissions from those diets and compare across them. What we found was that in the UK, a meat eating diet has about double the greenhouse gas emissions of a vegan diet and about 50% more greenhouse gas emissions than a vegetarian diet.

Georgia:

– I know some people say veganism definitely wins in terms of carbon emission, but can you be fully healthy cutting all of this out of your diet?

Peter:

– Well, the results there in the dietary epidemiology is a little bit more disputed. In non-randomized studies we see that vegetarians and vegans tend to have better health outcomes than meat eaters, but that might be due to confounding. There might be other elements there that vegetarians and vegans are fundamentally different types of people than meat eaters.

We know from the Cohort studies, which are studies which look at people with different diet groups and follow them up over a long time and see how there’s differences in health outcomes. We know that there’s lower cardiovascular disease outcomes related with a lower meat diet. We also know there’s now very good evidence that a lower meat diet, particularly red and processed meat diet, is related with lower colorectal cancer outcomes. We also know from randomised control trials of short term changes in meat consumption, so moving to small lower meat diets, that’s also associated with reduction in body weight, and reductions in blood cholesterol levels.

Georgia:

– What should we be doing on an individual and national level to try and reduce our carbon footprint?

Peter:

– If you’re living in a family and two meat eaters in that family decided to go vegetarian, then that’s roughly the same sort of carbon footprint as a small family car running for a year. Similarly, if you’re a meat eater and you move to be a vegan,

that's the same as an economy trip from London to New York on a plane. It's those sort of levels of carbon footprint you're talking about removing from these dietary choices.

The important thing is it isn't just about changing from being a meat eater to being a vegan, that's a big switch, it's a big lifestyle change that not many people would be willing to make. But we know that dietary greenhouse gas emissions are very well correlated with the amount of meat that you eat. So if you just reduce the amount of meat that you consume; start cutting it back on a few days a week, you'll make a big impact on your dietary carbon footprint.

On a global scale you're seeing that we're actually making some progress towards reducing greenhouse gas emissions in a lot of sectors. We're moving toward cleaner energy, solar power is getting cheaper and we can see a future where we can potentially have clean energy. Similarly, there with transport, if you're moving towards cleaner energy, you can see a world where we get clean transport.

With food, it's going in completely the opposite direction. The reason being there is because we've got more and more people on the planet that we need to feed. Because the developing world are getting richer, as time goes by they're moving towards more western diets, and that's a higher greenhouse gas emission footprint there.

Yet with all the global agreements on climate change, food never comes into it. It's just too complicated to be within those discussions. If that came into those discussions and if food started to get included and things like cap and trade schemes, then we could start seeing price and greenhouse gas emissions within the food system. But people are very worried about that because they don't want to see any kind of impact on food prices because that can have a lot of very negative knock on effects to the world's poorest people.

5. Complete the sentences using the text of the interview and translate them.

1. What changes could we make to our diets____
2. If everyone in Britain actually met those guidelines____
3. But the general message of being able to eat a healthy sustainable diet____
4. I know it's an age old debate____
5. That's particularly the case for ruminant meats____
6. We also know there's now very good evidence that____
7. The important thing is it isn't just about changing from being a meat eater____

6. Translate the sentences.

1. Немногие понимают, что то, что они едят, влияет на уровень выброса парниковых газов.

2. Если в нашем рационе содержится меньше мясных продуктов, а больше растительных, то это хорошо и для нашего здоровья, и для планеты в целом.

3. Можно заметить неэффективность системы выращивания скота.

4. Вегетарианцы это принципиально иной тип людей, нежели мясоеды.

5. Численность населения постоянно растет и всем этим людям необходима пища.

6. Рассмотрение еды, как фактора, влияющего на окружающую среду, может привести к повышению цен на продовольствие.

7. Do you believe that what we eat has such a great impact on the environment? Why? Why not? Give at least three reasons to support your viewpoint.

8. Give the written translation of the whole interview.

UNIT 6. ECHOLOCATION OF BATS

1. You will find all these words in the interview. Use the dictionary to get the meaning of the words from this list.

1. Brain
2. Obstacle
3. Figure out
4. Echolocation
5. Navigate
6. A three dimensional image
7. Vocalization
8. Measurement
9. Neurological radar
10. Nervous system
11. Nerve cells
12. Research
13. The superior colliculus
14. Estimate.

2. Listen to the interview and mark the statements as true (T) or false (F). (Use this link to listen to the interview <https://www.thenakedscientists.com/podcasts/elifepodcast/elifepodcast-47-batnav-tb-and-aspirin>)

1. There are a lot of studies that record from the brain of an animal as it moves through space and avoid obstacles on its way.

2. The echolocating bat is an ideal animal to study the navigation of an animal on its way with the obstacles.

3. Bats can navigate around the obstacles mostly with the help of their eyes and their sense of smell.

4. A bat can form a three dimensional image of the environment by making very loud intense high-frequency sounds reflecting from the objects around an animal.

5. Echolocation enables bats to estimate extremely accurately their way in the environment.

6. In their research the scientists don't train bats to navigate in a room around obstacles.

3. Listen to the interview once more and answer for the questions.

1. Why is an echolocating bat an ideal animal to study the mechanism of navigating in the environment around obstacles?
2. How can a bat form a three dimensional image of the environment?
3. What gives bats an accurate measurement of how far an object is?
4. What does the scientist do to know how the region of brain (the superior colliculus) works?
5. Why is the superior colliculus a very important part in the attention network?

4. Now read the text of the interview and do the other tasks.

How do our brains keep track of all the things around us? By studying bats flying around a specially adapted laboratory, avoiding obstacles as they went, Johns Hopkins scientists Melville Wohlgemuth and Ninad Kothari explained to Chris Smith how they've ventured where science doesn't seem to have dared to tread in the past...

Mel – Well, first think about if you're driving on the highway and you are merging from lane to lane, passing cars. You're trying to figure out where you are with respect to those vehicles, and you're trying to move forward so that you don't hit those vehicles, so you have to pay attention to one vehicle move around it change your attention to another vehicle and move around that. And this is a very common thing that we do quite frequently in everyday life, but it actually has not been studied in great detail. Very few studies actually record from the brain of an animal as it moves through space and attends to different objects to avoid them as it's doing their motion. So we found the echolocating bat to be an ideal animal for this particular study because we can train them to fly and navigate around obstacles much like they would in the wild when they're hunting and foraging for insects.

Chris – So, Ninad, how did you actually do this?

Ninad – So the way echolocating bats function they produce very loud, intense high-frequency sounds, which travel into the environment from their mouth; when they hit obstacles, some of these sound energies are reflected back; the bat listens to these echoes that are returning. And this is how the bat can form a three dimensional image of the environment that it is flying in. One very surprising and very interesting thing about echolocation is that it enables bats to estimate extremely accurately – as accurate as one millimetre – the way bats do this is they record when they produce the vocalization, and they record the time when the echo comes back. The time delay gives the bats an accurate measurement of how far an object is.

Chris – But do we know where that – for want of a better phrase – that neurological radar screen is playing out in their nervous system and, when there are blips on that radar screen, how the bat is encoding those blips so it knows where the objects or obstacles are and how they are moved relative to the bat as it flies around the environment? How do you try and probe that?

Ninad – That is where we go into the methods, and so a lot of research in the past has looked at this brain region which is called the superior colliculus. Past research has shown that this midbrain region – the superior colliculus – encodes for two dimensional space; it not only makes a sensory map of the region around the animal, but it also enables the animal to direct its gaze to locations in space. And so that is why we decided, in order to understand how the brain actually represents three dimensional space, to look at this brain region.

Chris – So what did you do, put some electrodes into that region so you could eavesdrop on what the nerve cells there were saying to each other?

Ninad – Exactly. So what we did is train the bats to navigate in a room around obstacles. Now once the bats are trained to navigate in space, we put electrodes in the superior colliculus. We now have a real time view of what the neurons are telling each other and now we are faced with a problem that's how you understand what stimulus, or what echoes, the bats are experiencing as they're flying around.

Chris – Because what you're recording is a bunch of electrical impulses coming off different nerve cells and they're going to change as the bats fly. So presumably you've got this problem: you've got to marry up where the bat is relative to each of the obstacles to then look for some kind of association between the bat in a certain position and the obstacle in a certain position, and it producing a specific and characteristic change in the nerve activity, so you can tie all those things together?

Ninad – Exactly. So in the flight room we have high speed motion capture video cameras, so we put markers on the bat's head, and as the bat flies around we can now get the instantaneous three dimensional position. In addition to this we can also get exactly where in space the bats head is pointed. So once we get the head direction of the bat, we can now record the ultrasonic vocalizations of the bat. So we have an area of 32 ultrasonic microphone channels which are lined all around the room. So wherever the bat flies we can record sonar vocalisations; wherever the bat is in space we can record its position and its heading; and now it is basically going back to a mathematical model, which we call as the Echo model, and now we can start asking questions like how do the neurons in the superior colliculus create a map of three dimensional space in the bat's brain?

Chris – And Mel, do you know the answer to that? How do the neurons in the superior colliculus – based on your recordings – seem to be encoding where the bat is?

Mel – When we actually have the bat fly in three dimensions, what we find is that these neurons in the superior colliculus fire for unique locations in three dimensional space; so if the bat is at a particular orientation with respect to one of these objects, there are neurons in the superior colliculus that fire when these objects are at a particular horizontal elevation and distance location with respect to the bat?

Chris – So is it tunable? Obviously the bat's not always going to be in your room. So there's going to be a different set of stimuli, in a different set of locations. So all these relative to the bat's present location, these cells, that fire off when the bat is at, say, 2 o'clock and five metres from something there will be a bunch of cells – a population – that will go off like a machine gun when it's in that orientation, in that position?

Mel – That's exactly right. So we talk about it being responsible for keeping track of egocentric space, and like the name suggests ego-centric is centred on yourself. So this particular part of the brain the superior colliculus it's all about the relative location of objects with respect to the animal, and that's why Ninad was saying that we were reconstructing the head aim of the bat, because as you move your head around the position of one object in space is going to change with respect to you. So we always need to know where the bat is with respect to these objects as it flies around in order to reconstruct the three dimensional tuning of these neurons in the superior colliculus. So it doesn't really matter what the object is, it's just whether an object is at a particular distance horizontal and elevation location with respect to the animal.

Chris – Ninad, what does the bat do with that tuned signal from a superior colliculus? How does that in turn translate into better attention for that target on the part of the animal?

Ninad – That's a very good question. So the superior colliculus is a very important part in the attention network. It sends out projections to the frontal cortex and it also sends projections to the motor nuclei, which actually drive behaviour. So now you can consider the superior colliculus computing this three dimensional information. It can send this to the cortex for further planning behaviour; and the sort of continuous feedback between sensory input and the superior colliculus back into the cortex can now help the animal plan its next movement, or the next location where in space it needs to pay attention to...

5. Find sentences in the text with the following words and translate them.

1. Three dimensional
2. Neurons in the superior colliculus
3. Egocentric space
4. Echo model
5. Ultrasonic vocalizations
6. Nerve activity
7. Different nerve cells
8. Stimulus
9. Neurological radar screen
10. Reflected back.

6. Put the words in the right order, write down them and then translate them.

1. Do /how /try /you / and /that /probe?
2. Produce /very /bats /loud /high frequency /intense /sounds.
3. The /delay /time /the /gives /bats /an /of /accurate /how /measurement /for /object /an /is.
4. Very /from /few /the /studies /brain /record /of /animal /as /an /moves /it /space /through / obstacles /with.
5. Us /of /the /all /how /our /do /track /around /things /keep /brains?

7. Give the written translation of the whole interview.

8. Give the summary of the interview in English and after it give your one opinion where can we use the results of this research.

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**ОБУЧЕНИЕ ПЕРЕВОДУ СПЕЦИАЛЬНЫХ ТЕКСТОВ ПО БИОЛОГИИ.
ЧАСТЬ 2.**

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