

平成 24 年 度

外 国 語(英語)

注意事項

1. 問題は 1 頁から 14 頁に掲載されています。
2. 解答に用いる言語(日本語あるいは英語)は各設問の指示に従って選びなさい。
ただし、記号で答えるように求められている場合はそのようにしなさい。
3. 解答は必ず解答用紙に記入しなさい。

問題訂正

問題に訂正があります。

訂正の内容は、下枠内に記載してあるとおりです。

問題訂正

(1) 教科・科目名 外国語 (英語)

(2) 訂正する問題 PART2

(3) 訂正箇所 11 ページ (* → ①～④に訂正)

以下のとおり訂正しますので、この訂正により解答しなさい。

QUESTIONS

When answering all these questions, please use the answer sheets.

Question 1. Choose one from the four choices that is closest in meaning to the underlined word in the text.

① to unfold

- (a) to be made known
- (b) to become unclear
- (c) to be made tolerable
- (d) to become confusing

② nexus

- (a) mixture
- (b) network
- (c) contrast
- (d) connection

③ squarely

- (a) totally
- (b) directly
- (c) immediately
- (d) optimistically

④ to dispel (something)

- (a) to clear (something up)
- (b) to smooth (something out)
- (c) to challenge (something directly)
- (d) to destroy (something completely)

各問は一区切りの文章のあとに記されているので、それぞれの区切りについて解答してから次の区切り(問)に進むこと。

問 1, 3 および 4 は日本語で答える。ただし問 2 は記号を選ぶこと。

DREAMING OF CHEMICAL GARDENS

By Andrew D. Thibedeau

(an edited version of the original article)

from:

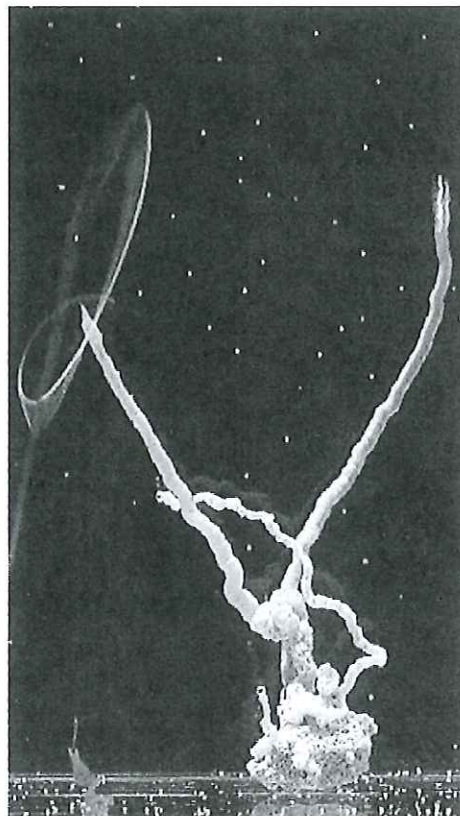
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It is the ambition of synthetic biology to unlock the secrets of life by creating it anew. This is, of course, the ambition of all biology — to discover unknown facts about how life works. To say that something is synthetic, however, is to say that it is artificial, fake, false, man-made, manufactured, or fabricated. In the realm of biology, these terms carry a host of negative implications. It is the artificiality of biotechnology itself that gives rise to many central issues in bioethics. What is more, modern culture has created symbolic representations of fear regarding the notion of man-made life. As the title of one book on the subject suggests, to create synthetic life is to walk in Frankenstein’s footsteps. But does the field of synthetic biology resemble Dr. Frankenstein’s laboratory? I argue that it does not. Rather, the label “synthetic” has attached to synthetic biology many negative linguistic associations such as copying and imitation.

Synthetic biology is the ongoing effort to develop artificial systems in order to explore new functions by modifying existing organisms. It aspires to make both cellular and non-cellular biological structures that function in ways not found in the natural environment. It is in this sense unnatural. The creation of artificial systems is not an end in itself, but rather a means to improve the understanding of various biological mechanisms. In other words, synthetic biology is a method.

Method can be described as “the proper arrangement of our mental processes in the discovery and proof of truth”. There are two primary methods: analysis and synthesis. Analysis proceeds from the concrete to the abstract, from the complex to the simple, from the phenomena to the underlying general law, or from the effect to the cause. Synthesis is the converse of analysis. It passes from the simple to the complex, from the general to the special, or from cause to effect. My focus is the latter. My argument is that a consideration of the meaning of synthesis as a scientific methodology suggests that synthetic biology can be viewed as valuable as a means to an end.

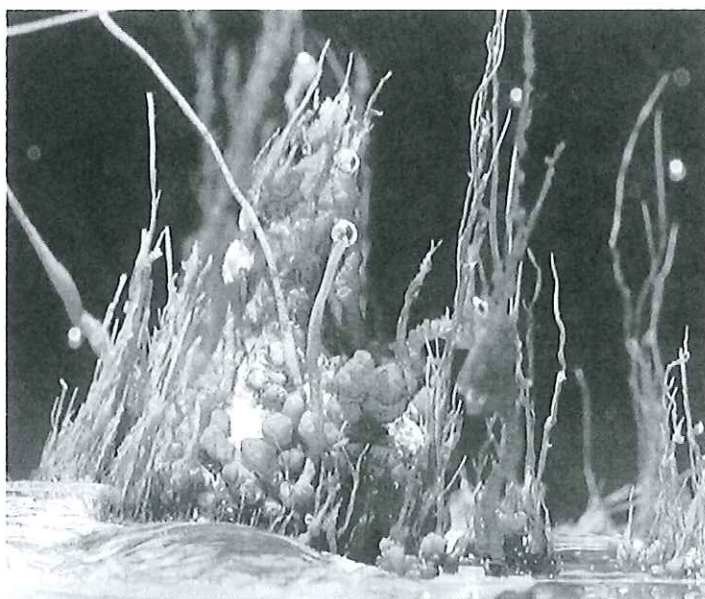
<注>

synthetic biology : 日本語では「合成生物学」(あるいは「構成的生物学」と表記される。

Frankenstein : 19世紀英国の作家 Mary Shelley (1797-1851)の代表作 *Frankenstein* (1818)の主人公である(複数の死体からとった身体の部分を組み合わせてつくった)「怪物」の名前。この名前は当の怪物を創造した, mad scientist の典型といえる Dr. Victor Frankenstein の苗字に由来する。

methodology : a set of methods and principles used to carry out a particular activity.

問 1 下線部①によると著者は synthetic biology の本質をどうとらえているのか。



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In the first decade of the 20th Century, French scientist Stéphane Leduc (1853-1939) showed that a spectacular plant-like growth occurs when crystals of metal salts are dropped into an aqueous solution of sodium silicate. His experiments produced multicolored plant-like filaments that appeared to grow from crystal surfaces, which he called “les jardins chimiques” (in French)—

“chemical gardens” in English. To microscope and naked eye alike, Leduc’s chemical gardens were highly biomimetic. Long green stalks grew from turquoise beds of crystal; osmotic action produced cell-like structures that seemed indistinguishable from simple prokaryotes. Based on these experiments, in 1912 Leduc published *Synthetic Biology*, in which he postulated using chemical synthesis as a means to understand the basic biology of organic growth and morphology. He believed his work held the key to general laws of life. These laws, Leduc believed, could illuminate the nature and origin of life by bridging the gap between the living and the nonliving, offering a new version of the missing link between inorganic and organic.^②

<注>

metal salt : 金属塩(塩化ナトリウムなど)。

Stéphane Leduc : [読み]ステファーン・ルデュック。

aqueous solution : 水溶液。

sodium silicate : ケイ酸ナトリウム(水に可溶で、水溶液は加水分解されてアルカリ性を示す。濃水溶液は水ガラスという)。

biomimesis (形容詞形は biomimetic) : 植物や昆虫など自然界の生物が持つ機能を物作り・科学研究に生かす「生物模倣」をさす。ちなみに、この概念の実用化に向けてバイオミメティックス(biomimetics)とよばれる研究領域が世界的に展開されている。例えばヤモリが壁や天井などを這い回れるのはその足裏のナノテク・レベルの極細な繊毛と壁面などの間に働くファンデルワールスカのおかげだが、その仕組みを解明できれば人間が使う特殊な吸盤を開発できるかもしれない。スパイダーマンも夢ではない。

turquoise : 青緑色の。

osmotic action : 浸透作用。

prokaryote : 原核生物(細菌・藍藻などのように細胞内に核を持たない生物)。核を持つ真核生物(eukaryote)に対していう。

morphology : 形態。

問 2 下線部②の内容の解説として最も適当なものを次の5つの選択肢から一つ選べ。

- a. Based on his experiments that demonstrated that there are interesting similarities between living and non-living things, Leduc proposed a hypothesis to explain how life on earth began to develop.
- b. Leduc's own version of synthetic biology had produced a link where artificial life imitated the appearance of living organisms.
- c. Among many theories regarding the origin of life from inorganic matter, Leduc's new version was less complex.
- d. Leduc's work showed unknown similarities between mineral crystals grown in his test-tubes and natural plants in the garden.
- e. Based on Leduc's work, humans will most likely be able to outwit nature and create living organisms from inorganic materials.

Although the chemical garden experiment ultimately failed to relate to the processes of life, Leduc's work nevertheless stands with that of Darwin and Pasteur because of his method. In this sense, his experiments are a testament to the synthetic: not as something "artificial" or "man-made," but as a methodological approach to biology. As Leduc wrote in *The Mechanism of Life* (1911):

Each branch of science at its commencement employs only the simpler methods of observation. It is purely descriptive. The next step is to separate the different parts of the object studied—to analyze. The science has now become analytical. The final stage is to reproduce the substances, the forms, and the phenomena which had been the subject of investigation. The science has at last become synthetic.

Following Leduc, synthesis as a scientific methodology has certain inherent
③ advantages over analysis. To approach a problem analytically is to arrive at a
generalization grounded in observations of individual phenomena. It is the work
of science to build up these generalizations into theories that aim to explain the
phenomena. Galileo's study of planetary motion, for example, led to his
refinement of Copernicus' heliocentric theory of astronomy.

<注>

Galileo Galilei's lifetime : 1564-1642.

Nicolaus Copernicus' lifetime : 1473-1543.

heliocentric : having the sun at its center.

問 3 下線部③の趣旨を明らかにせよ。その際, Copernicus の仮説に正面から取
り組んだ Galileo (の科学者としての方法論)を引き合いに出すこと。

For biology today, the value of Leduc's concept of synthetic biology lies in its
④ potential to reveal unknown features of life. In micropaleontology, for example,
morphology, as shown in Leduc's "chemical gardens", is still one of the main
criteria to decide whether microfossils could be considered as traces of life rather
than just mineral forms. Although more sophisticated models of crystallization
processes now determine the boundary between the living and the nonliving,
Leduc's methodology still serves as a means of producing useful knowledge.
Another important discovery attributable to synthetic biology is the development
of the branched DNA diagnostic method — a medical tool that "helps to manage
the care of approximately 400,000 patients infected with HIV and hepatitis
viruses each year". Only by working to devise synthetic genetic systems did
researchers come to understand the biology behind this important technology.
Thus, to the extent that its outcomes remain consistent with aims such as these,
⑤ the negative implication of synthetic ought not obscure the utility of synthetic
biology.

It should be remembered that the creature created by Dr. Frankenstein had both emotion and a moral conscience. In the end, he takes his own life, but not before expressing remorse at the death of his creator. The creature, in other words, was an ethical being, valuable unto himself — rather than as the end of a particular project of research. In a very true sense, the monstrosity of the story belonged to Dr. Frankenstein, who created a being by nature so disjointed that he could not survive in the human world. Unlike Dr. Frankenstein's doomed creation, the work of Leduc and modern synthetic biology does not seek to create beings capable of either pain or pleasure. It does not seek to engage in nothing but the act of creation, but to know through the act of creation. On this view, there is a strong reason to defend synthetic biology against its negative linguistic associations: the value of the knowledge gained by its pursuit.

<注>

micropaleontology : 微化石 (microfossil) を研究対象とする古生物学。

microfossils : 微化石 (大きさが数 mm 以下の特に小さい化石。例えば有孔虫, 珪藻, 放射虫, 貝形虫, 花粉, 胞子, 海綿の骨針)。

the branched DNA diagnostic method : 分岐 DNA 法 (C 型肝炎やエイズなどの検査法)。

disjointed : not connected in a clear or logical way.

問 4 下線部⑥によると synthetic biology がどういう意味で科学研究上有意義だ
というのか。解答に際しては下線部④および⑤も合わせて考慮すること。

A Visit to Chernobyl

from:

International Herald Tribune

26 April 2011

Read the text and answer the questions below. Your answers should be in your own words and not copied directly from the text.

Twenty-five years ago, the explosion at Chernobyl cast a radioactive cloud over Europe and a shadow around the world. Today, the tragedy at Japan's Fukushima Daiichi nuclear power plant continues to unfold, raising popular fears and difficult questions.

Visiting Chernobyl a few days ago, I saw the reactor, still deadly but encased in concrete. The adjoining town of Pripyat was dead and silent — houses empty and falling into ruin, mute evidence of lives left behind, an entire world abandoned and lost to those who loved it.

More than 300,000 people were displaced in the Chernobyl disaster; roughly six million were affected. In terms of area, approximately half the size of Italy or my own country, the Republic of Korea, was contaminated.

It is one thing to read about Chernobyl from afar. It is another to actually
(1) see it. For me, the experience was profoundly moving, and the images will stay with me for many years. I was reminded of a Ukrainian proverb: "There is no such thing as someone else's sorrow." The same is true of nuclear disasters. There is no such thing as some other country's catastrophe.

As we are painfully learning once again, nuclear accidents respect no borders. They pose a direct threat to human health and the environment. They cause economic disruptions affecting everything from agricultural production to trade and global services.

This is a moment for deep reflection, a time for a real global debate. ⁽²⁾ To many, nuclear energy looks to be a clean and logical choice in an era of increasing resource scarcity. Yet the record requires us to ask: have we correctly calculated its risks and costs? Are we doing all we can to keep the world's people safe?

Because the consequences are catastrophic, safety must be paramount. Because the impact is transnational, these issues must be debated globally.

That is why, visiting Ukraine for the 25th anniversary of the disaster, I put forward a five-point strategy to improve nuclear safety for our future:

- First, it is time for a top to bottom review of current safety standards, both at the national and international levels.
- Second, we need to strengthen the work of the International Atomic Energy Agency on nuclear safety.
- Third, we must put a sharper focus on the new nexus between natural disasters and nuclear safety. Climate change means more incidents of unpredictable and increasingly severe weather. With the number of nuclear facilities set to increase substantially over the coming decades, our vulnerability will grow.
- Fourth, we must undertake a new cost-benefit analysis of nuclear energy, factoring in the costs of disaster preparedness and prevention as well as cleanup when things go wrong.
- Fifth and finally, we need to build a stronger connection between nuclear safety and nuclear security. At a time when terrorists seek nuclear materials, we can say with confidence that a nuclear plant that is safer for its community is also more secure for the world.

My visit to Chernobyl was not the first time I have traveled to a nuclear site. A year ago, I went to Semipalatinsk in Kazakhstan, ground zero for nuclear

testing in the former Soviet Union. Last summer in Japan, I met with the Hibakusha, survivors of the atomic blasts at Nagasaki and Hiroshima.

I went to these places in my capacity as a United Nations official to highlight the importance of disarmament to world peace. For decades, negotiators have sought agreement on limiting (and perhaps ultimately eliminating) nuclear weapons. And this past year, we have seen very encouraging progress.

With the memory of Chernobyl and, now, the disaster in Fukushima, we must widen our lens. Henceforth, we must treat the issue of nuclear safety as seriously as we do nuclear weapons.

The world has witnessed an unnerving history of near-accidents. It is time to face facts squarely. We owe it to our citizens to practice the highest standards of emergency preparedness and response, from the design of new facilities through construction and operation to their eventual shutdown.

Issues of nuclear power and safety are no longer purely matters of national policy, alone. They are a matter of global public interest. We need international standards for construction, agreed guarantees of public safety, full transparency and information-sharing among nations.

Let us make that the enduring legacy of Chernobyl. Amid the silence there, I saw signs of life returning. A new protective shield is being erected over the damaged reactor. People are beginning to return. Let us resolve to dispel the last cloud of Chernobyl and offer a better future for people who have lived for too long under its shadow.

QUESTIONS

When answering all these questions, please use the answer sheets.

Question 1. Choose one from the four choices that is closest in meaning to the underlined word in the text.

*to unfold

- (a) to be made known
- (b) to become unclear
- (c) to be made tolerable
- (d) to become confusing

*nexus

- (a) mixture
- (b) network
- (c) contrast
- (d) connection

*squarely

- (a) totally
- (b) directly
- (c) immediately
- (d) optimistically

*to dispel (something)

- (a) to clear (something up)
- (b) to smooth (something out)
- (c) to challenge (something directly)
- (d) to destroy (something completely)

Question 2. What does the author mean by the sentences underlined (1)? What kind of things did the author experience? Explain in English in less than 50 words.

Question 3. What does the author mean by the sentence underlined (2)? In particular, what kind of time is “an era of increasing resource scarcity”? Explain in English in less than 50 words.

Question 4. What does the author consider as the most important? Choose one from below.

- (a) assuring nuclear safety
- (b) limiting nuclear weapons
- (c) providing proper medical care
- (d) sharing information among nations

Question 5. Complete the sentences below by selecting one from the four choices given that is consistent with the contents of the text.

(1) The author is most likely:

- (a) the President of Ukraine.
- (b) an ambassador of the Republic of Korea.
- (c) the Secretary General of the United Nations.
- (d) the Director General of the International Atomic Energy Agency.

(2) The author probably has not yet visited:

- (a) Pripyat.
- (b) Nagasaki.
- (c) Fukushima.
- (d) Semipalatinsk.

- (3) The author's proposed strategies for future nuclear safety recommends:
- (a) issues of nuclear safety should only be matters of national policy.
 - (b) people displaced from their towns should not be allowed back .
 - (c) the International Atomic Energy Agency should be given stronger power.
 - (d) a new protective shield should be constructed immediately to cover damaged reactors.

Write an essay on the following topic.

Your essay should:

1. be a minimum of 150 words,
2. be written using paragraph form,
3. have a minimum of three paragraphs,
4. have a clear introduction, body and conclusion,
5. leave a one-line space between each paragraph.

Do not double-space your essay; write on every line.

In your essay, your ideas should be clearly expressed.

Topic:

Many medical students find the time to travel abroad during their six years at this university, both for recreation and study purposes. If you had the opportunity to travel abroad during your medical studies, which country would you like to travel to? Give at least two reasons for choosing this country. What would you do there?