’18

前期日程

小論文

（医学部医学科）

注　意　事　項

1. 試験開始の合図があるまで，この問題冊子を開いてはいけません。
2. 問題冊子は１冊（７頁），解答用紙は３枚，下書用紙は２枚です。落丁，乱丁，印刷不鮮明の箇所等があった場合には申し出てください。
3. 氏名と受験番号は解答用紙の所定の欄に記入してください。
4. 解答は指定の解答用紙に記入してください。
   （１）文字はわかりやすく，横書きで，はっきり記入してください。
   （２）解答の字数に制限がある場合には，それを守ってください。
   （３）訂正，挿入の語句は余白に記入してください。
   （４）ローマ字，数字を使用するときは，マス目にとらわれなくてもかまいません。
5. 解答用紙は持ち帰ってはいけません。
6. 問題冊子と下書用紙は持ち帰ってください。

次の文章を読んで，問１～12 に答えなさい。文末の訳注一覧に，*のついた単語の訳注があります。

It's nice to think of modern medicine, like modern war, as hi-tech, almost impersonal. Our medications are engineered on a molecular level. Keyhole surgery*, computerized imaging, and robotics promise magical, almost uninvasive* modes of health maintenance. So why are doctors using leeches (1) again?

The medicinal leech has three jaws and a hundred teeth. With them it saws into the skin and injects anaesthetics* to avoid disturbing its meal, chemicals that dilate* the blood vessels in order to get a better flow of the good stuff, and anticoagulants* to stop the blood clotting* and impeding* its feast. Then it starts to suck. A leech can take in up to ten times its own body weight in human blood. Nightmarish*, right?

The therapeutic use of leeches has a long history (2). It is recorded in ancient Indian and Greek handbooks of medicine. In medieval and early-modern European medicine, patients were bled for a wide variety of supposed imbalances to the bodily humours*. Do you have a red skin from fever? Too much blood: leech. Acting flighty*? You're probably too sanguine*, which means you have too much blood: leech. (For their remarkably regular recourse* to bleeding, doctors themselves were often called leeches.) In the nineteenth century there was a Europe-wide craze for leeching, following the theory of a Napoleonic doctor who held that all illness resulted from inflammation of the intestines*: starvation and bleeding, he believed, would purge the body of the toxic effects. Leeches were considered the ideal treatment for everything from nymphomania* to tuberculosis*. The United States imported millions of leeches from Germany, because American leeches were not as good at sucking blood. But eventually chemistry and biology prevailed, and by the beginning of the twentieth century leeches had been consigned* to the disgusting history of unscientific medicine.

Then, in 1985, a dog bit the right ear off a five-year-old boy from the Boston (3)

suburbs. The boy's physician, a plastic surgeon* named Joseph Upton, managed to reattach the ear, but it began to turn black and die: blood could get into it but not out again, because of clotting in the veins. Blood-thinning agents didn't help; nor did lancing* the ear. Luckily, however, Upton remembered an article he had once read about the therapeutic effects of leeches on congested* tissue. He found the contact details of a company, Biopharm, that grew and sold leeches. (It had been set up only a couple of years earlier by a zoologist called Roy T. Sawyer, who had written a definitive three-volume study of the biology and behavior of leeches, and suspected they were due a medical comeback because of all those interesting chemicals in their saliva.) Biopharm was in Wales, so thirty leeches were flown across the Atlantic to Boston. Joseph Upton attached two to the boy's congested ear, and in minutes it began to recover its healthy colour. After a couple of days the organ was fine, and Upton became the first doctor to have successfully reattached the ear of a child using microsurgery. Plus a couple of vampiric* slugs.

Upton's rediscovery had in fact been predated by others; remember, after all, that he'd seen an article on the subject. Two plastic surgeons in Yugoslavia announced the positive results of their experimentation with leeches to treat vein congestion in the *British Journal of Plastic Surgery* in 1960, though they concluded that other methods should be sought. In 1972 a French surgeon, Jacques Baudet, successfully used leeches to [(ア)] post-operative blood-clotting, and his techniques were imitated in France and UK. Baudet's work was described in the *New York Times* in 1981, and it may have been this report, if not the earlier medical articles, that Upton remembered seeing four years later when faced with a child's ear turning black. In any case, third time lucky — it was Upton's sensational success that made the headlines and ushered in the real leech renaissance. Leeches became widely used in the US, and in 2004 the FDA* approved leeches as a 'medical device', enabling new leech-farming companies from other countries to enter the market. Today leeches are

frequently used in reattachment operations, skin grafts*, and reconstructive plastic surgery, since they are so good at keeping the patient's blood flowing in the damaged area, which helps the veins to knit together again.

The active anticoagulant in leech saliva, a protein named hirudin, can be produced separately, and Biopharm, which is still a going concern, has isolated and resynthesised many other active and useful compounds from the medicinal leech and other species — including the terrifying giant Amazon leech, which is the length of your forearm and stabs its prey with a six-inch needle proboscis*. But the humble old medicinal leech still has a winning combination of effects, plus it is cheap — and automatically reproduces itself. Perhaps even more surprisingly, it turns out that leeches also [(イ)] symptoms of osteoarthritis* when applied to the knees, because of anti-inflammatory* and other compounds in their saliva that are still not fully understood. They have fewer side effects than the standard treatment of non-steroidal* anti-inflammatory drugs, and they are more effective in relieving pain and stiffness than the best topically applied medication. And so one traditional use of leeches, in Ayurvedic medicine* and other systems — to relieve pain and inflammation — had it right all along.

As it happened, Joseph Upton had previous experience in resurrecting disgusting medical practices from the past. He had served as an army doctor posted in Augusta, Georgia during the Vietnam War, when many returning soldiers were suffering from badly infected wounds. Upton knew that Civil War doctors had used maggots (4) — they feed only on dead flesh, and so are very effective at debriding (cleaning out) unviable* tissue from wounds. He took a chance and used maggots on his soldiers — with great success, until the brass* heard about it and threatened him with a court martial*. Years later, when Upton had his idea to save the boy's ear, he remembered that experience (5), and decided not to tell his superiors that he planned to use leeches. He just went ahead and did it himself. Sometimes, a rethinker has to break the rules. (6)

The rediscovery and re-evaluation of traditional remedies is quite common in

modern science. Traditional Chinese medicine (TCM), for example, is largely taken to be ineffective by Western researchers. And yet it set one woman on the path to a Nobel Prize. In 1969, a Chinese pharmacologist named Tu Youyou began working on a secret government project to search for new anti-malaria drugs. Extracts from the plant *Artemisia annua* (sweet wormwood*) seemed to be good candidates, but the results were inconsistent. So Tu went back to the ancient TCM literature for clues. In a textbook from the fourth century CE*, she found a herbal-recipe remedy based on *Artemisia*. (7) It contained the information that eventually set her on the right path to a reliable extraction method. The book said that wormwood should be soaked in water, but Tu had been boiling it. Now she realised that she must have been damaging the active ingredient somehow. After all, the ancient doctors could have boiled it as easily 1,400 years ago, but they didn't. So Tu switched to using an ether*-based solvent*, and tested the results on mice and then herself, before performing further clinical trials. It was soon clear that she had 'cured drug-resistant malaria'. Tu had created a powerful new drug, artemisinin, which is now the main anti-malarial medication worldwide. For that break-through she was awarded the 2015 Nobel Prize in Physiology or Medicine. Now that is rethinking in action. And it all happened because of a conscious decision to return to old ideas in the face of new circumstances.

The government project Tu was working on had been set up in 1967, not long after the Cultural Revolution* began closing many universities and 'purging' intellectuals, including China's top malaria researcher. But in the mean time China's allies in Vietnam, the Vietcong and North Vietnamese Army, were suffering huge casualties from malaria epidemics, which often killed more soldiers than actual fighting. Malarial resistance to the available drugs, in both Vietnam and southern China, was also increasing rapidly: the most powerful current treatment, chloroquine, was increasingly hit-and-miss. So Ho Chi Minh persuaded the Chinese government to try to develop new ones. A top-secret military

research group, Project 523, was set up, with one section of it operating under a specific remit to look to the past, in the form of traditional Chinese medicine. And that was how Tu Youyou [(ウ)] an old idea that was right for a new era. Her work went on to save millions of lives all over the world.

(Steven Poole 著, Rethink: The Surprising History of New Ideas, Penguin Random House(2016)より, 一部改変。)

＊ 訳注一覧

keyhole surgery：鍵穴手術(小さな切開部から内視鏡を入れて行う手術のこと)
uninvasive：非侵襲的な　anaesthetics：麻酔薬
dilate：広げる　anticoagulant：抗凝固剤　clotting：固まる
impeding：妨げる　nightmarish：悪夢のような　humours：体液
flighty：気の違った, 突飛な　sanguine：楽天的な, 多血質の
recourse：依存, 頼ること　intestine：腸管
nymphomania：異常性欲　tuberculosis：結核　consign：追いやる
plastic surgeon：形成外科医　lancing：切開　congested：うっ血した
vampiric：吸血鬼の
FDA：Food and Drug Administration の略, 米国食品医薬品局
skin grafts：皮膚移植　proboscis：口器, 吻
osteoarthritis：変形性関節症　anti-inflammatory：抗炎症作用の
non-steroidal：非ステロイド性の
Ayurvedic medicine：アーユルヴェーダ医術(インドの伝統的治療法)
unviable：生存できない　brass：(軍隊の)高級将校
court martial：軍法会議　sweet wormwood：クソニンジン(植物の一種)
CE：西暦　ether：エーテル(ジエチルエーテル)　solvent：溶媒
Cultural Revolution：文化大革命

問 1　下線部(1)の "leech" の身体的特徴，および "leech" が効率よく血液を吸うための機序を本文に即して 160 字以内で述べよ。

問 2　下線部(2)の内容を 200 字以内で要約せよ。

問 3　下線部(3)を 160 字以内で日本語に訳せ。

問 4　本文中の空欄(ア)にあてはまるもっとも適切な単語を以下のＡ～Ｄの中から一つ選び，記号で答えよ。

Ａ：incubate　　Ｂ：maintain　　Ｃ：prevent　　Ｄ：produce

問 5　本文中の空欄(イ)にあてはまるもっとも適切な単語を以下のＡ～Ｄの中から一つ選び，記号で答えよ。

Ａ：relieve　　Ｂ：refine　　Ｃ：develop　　Ｄ：worsen

問 6　下線部(4)の "maggot" の持つ性質，および "maggot" がどのような医学上の目的で使われたのかを 60 字以内で述べよ。

問 7　下線部(5)の内容を 60 字以内で簡潔に述べよ。

問 8　下線部(6)について，筆者のいう "rethinker" とはどのような人を指すのかを 60 字以内で述べよ。

問 9　現代の医学医療の倫理や規範に照らし合わせると，Upton がおこなった新しい治療法にはどのような問題点が考えられるかを 120 字以内で述べよ。

問10　下線部(7)について，Tu はどのような情報に注目し，抽出法をどのように変えたかを 60 字以内で述べよ。

問11　本文中の空欄(ウ)にあてはまるもっとも適切な単語を以下のA～Dの中から一つ選び，記号で答えよ。

A：declined　　B：rediscovered

C：reminded　　D：yielded

問12　"leech" および "maggot" の語を日本語に訳せ。

（以下，余白）