

# 奈良県立医科大学 前期

令和 2 年 度

試 験 問 題 ②

## 学 科 試 験

(9 時 ~ 12 時)

### 【注 意】

1. 試験開始の合図があるまで、この問題冊子の中をみてはならない。
2. 試験教科、試験科目、ページ、解答用紙および選択方法は下表のとおりである。

教 科	科 目	ペー ジ	解 答 用 紙 数	選 択 方 法
数 学	数 学	1 ~ 10	2 枚	数学、英語は必須解答とする。
英 語	英 語	11 ~ 14	3 枚	
理 科	化 学	15 ~ 28	2 枚	理科は左の 3 科目のうちから 1 科目を選択せよ。
	生 物	29 ~ 46	2 枚	
	物 理	47 ~ 54	1 枚	

3. 監督者の指示に従って、選択しない理科科目を含む全解答用紙(10枚)に受験番号と選択科目(理科のみ)を記入せよ。
  - ① 受験番号欄に受験番号を記入せよ。
  - ② 理科は選択科目記入欄に選択する 1 科目を○印で示せ。

上記①, ②の記入がないもの、および理科 2 科目または理科 3 科目選択した場合は答案全部を無効とする。
4. 解答はすべて解答用紙の対応する場所に記入せよ。
5. 問題冊子の余白を使って、計算等を行ってもよい。
6. 試験開始後、問題冊子の印刷不鮮明、ページの落丁・乱丁および解答用紙の汚れ等に気づいた場合は、手を挙げて監督者に知らせよ。
7. 解答用紙はいずれのページも切り離してはならない。
8. 解答用紙は持ち帰ってはならない。問題冊子は持ち帰ってよい。

## 英 語

I. 次の英文を読んで、設問に答えよ。( \*印の語には注がある。 )(90点)

To scientists who study lakes and rivers, it seems that humans have started a huge unplanned experiment. By burning fossil fuels\*, we have already raised the concentration of carbon dioxide (CO<sub>2</sub>) in the atmosphere by 40 percent, and we're on track to increase it by much more. Scientists began taking continuous measurements of carbon dioxide in the atmosphere in the 1950s, and today they have more than six decades of consistent readings. In the 1980s, ocean researchers did the same, developing carbon dioxide sensors and placing them across the planet. (1) 過去 30 年間に渡って、それらは海水中の二酸化炭素の継続的な上昇を記録した。濃度の増加は多くの点で海洋生物に被害を与える可能性がある。

The concentration of carbon dioxide lowers the pH level of seawater, for one thing, making it more acidic and interfering with the chemical process through which coral\* build their calcium bodies. Ocean acidification also thins the shells of shellfish and other marine animals. Many such animals rely on chemical changes in the water to find food and avoid danger. (2) Many fish are not able to detect their predators\* anymore,” said Linda C. Weiss, an ocean biologist at Ruhr University Bochum in Germany.

Dr. Weiss first came to appreciate the impact of ocean acidification in 2010, when she spent time at a marine research station in Australia. The experience left her wondering if lakes and rivers might face a similar threat. Her first step was to look for historical data about carbon dioxide levels in fresh water. But a search of previous studies brought her to a surprising conclusion. “I discovered (3) there was no information,” she said. Traditionally, scientists who have studied rivers and lakes have focused on different questions. They've been more concerned, for example, with sulfuric acid\* and other pollutants\* in acid rain, along with the impacts of runoff\* from farms and yards.

Dr. Weiss and her colleagues tried to figure out the carbon dioxide levels in four reservoirs\* in Germany from 1981 to 2015. They reported in the journal Current Biology that the amounts tripled in that time. “We didn't really know what to expect,” Dr. Weiss said. “But the speed of acidification, we find, is quite fast.” The researchers wondered

what effects this fast rise in carbon dioxide might have on freshwater life in decades to come. So they ran experiments on the water flea\*.

These tiny, shrimp-like creatures filter algae\* and microbes\* from water. They are eaten in turn by small fish, which are eaten by bigger fish. If rising levels of carbon dioxide were to affect water fleas, Dr. Weiss reasoned, it could influence the entire lake ecosystem\*.

Water fleas use (4)a strange but effective defense to escape predators. They can sense chemicals given off by fish in their area and, in response, they make themselves harder to eat. Some species grow a large crest\* on their head, while others grow spikes. Dr. Weiss and her colleagues found that high levels of carbon dioxide caused water fleas to make smaller crests and shorter spikes. Rather than the acidity of the water, carbon dioxide itself seems to be affecting the water fleas. (5)When the researchers lowered the pH level with hydrochloric acid\*, the water fleas responded normally to predators. Dr. Weiss concluded that carbon dioxide interferes with the nervous system of the water fleas, reducing their ability to detect predators.

注

- fossil fuels\* 化石燃料 (石炭・石油などを原料とした燃料)  
coral\* サンゴ (珊瑚)  
predators\* 捕食者, 捕食動物  
sulfuric acid\* 硫酸  
pollutants\* (環境)汚染物質  
runoff\* (地中に吸収されずに流れる)雨水あるいは排水  
reservoirs\* (天然または人工の貯水池)湖, 池など  
water flea\* ミジンコ  
algae\* 藻 [alga の複数形]  
microbes\* 微生物  
ecosystem\* 生態系  
crest\* トサカ, あるいは, かぶつのようなもの  
hydrochloric acid\* 塩酸

設問

1. 下線部(1) を英訳せよ。(20 点)
2. 下線部(2) について, このようなことが発生する理由は何か, この段落の記述を利用して日本語で答えよ。(15 点)
3. 下線部(3) はどのような状況をさすのか, またなぜそのようなことが起きたのかを, 日本語で答えよ。(20 点)
4. 下線部(4) は具体的に何を指すか日本語で答えよ。(15 点)
5. 下線部(5) について, この実験は何を確認するために行われたと推定されるか, 日本語で答えよ。(20 点)

II. Write approximately 120 words in English about what things you think individuals should do to reduce the concentration of CO<sub>2</sub> in the atmosphere. Why do you think they will be effective? This task will be marked on both content and the accuracy of the English language used.

(別紙解答用紙IIの様式にしたがって論述せよ。) (40 点)

III. Write approximately 80 words in English about a happy memory from your life. This task will be marked on both content and the accuracy of the English language used.

(20 点)