滋賀医科大学

令和6年度

医学科一般選抜(前期日程)

問題冊子

英　　語

(注　意)

1. 問題冊子は試験開始の合図があるまで開かないこと。
2. 問題冊子は表紙のほか9ページである。
3. 試験中に問題冊子及び解答用紙の印刷不鮮明，ページの落丁・乱丁等に気付いた場合は，手を挙げて監督者に知らせること。
4. 解答用紙のすべてに受験番号及び氏名をはっきり記入すること。
5. 解答はすべて解答用紙の所定の解答欄に明瞭に記入すること。
6. 解答に関係のないことを書いた答案は，無効にすることがある。
7. 本学受験票を机の右上に出しておくこと。
8. 試験時間は90分である。
9. 問題冊子は持ち帰ってもよいが，解答用紙は持ち帰らないこと。

英　　語 （3問題）

Ⅰ．次の文章を読んで，下の設問に本文の内容に沿って答えよ。他の指示がない限り，記号以外の解答はすべて日本語ですること。右側に＊印のある語には注がある。　（配点 74 点）

［1］ When I first started my job as a biologist at the University of South Florida, I drove my Jeep to a grassy field, dug up a pile of fire ants and put them into a large bucket. Immediately, thousands of ants rushed（**a**）of the soil and（**b**）the walls of the bucket headed（**c**）freedom. Luckily, I had a tight cover.

［2］ How do ants make climbing walls, ceilings, and other surfaces look so easy? I have been studying ants for 30 years, and their climbing abilities never cease（**d**）amaze me. Worker fire ants — who are all female — have an impressive box of tools including claws*, spines*, hairs, and sticky* cushions*（**e**）their feet that enable them to climb almost any surface.

［3］ To understand ant feet, it helps to compare them with human hands. Your hand has one broad section, the palm. Extending from your palm are four fingers and a thumb. Each finger has three sections, while your thumb has only two. A hard nail grows from the tips of your fingers and thumb. Humans have two hands — ants have six feet. Ant feet are similar to your hands but are more complex, with an additional set of strange-looking parts that allow them to do remarkable things. Ant feet have five jointed* sections, with the end section displaying a pair of claws. The claws are shaped like a cat's and can grip cracks and other rough features on walls. Each foot section also has thick and thin spines and hairs that provide additional grip by sticking into microscopic pits on rough surfaces like bark. Claws and spines have the added benefit of protecting ant feet from hot pavement and sharp objects, just as your feet are protected by shoes.

［4］ However, the feature that truly separates human hands from ant feet are sticky balloon-like pads, called arolia, that may be filled with fluid. Arolia are located between the claws at the tip of every ant foot and allow ants to overcome gravity and crawl on ceilings or extremely hard surfaces like glass.

［5］ When an ant walks up a wall or across a ceiling, gravity causes its claws to swing wide and pull back. At the same time, its leg muscles pump fluid into the pads at the end of its

feet, causing them to inflate. This body fluid is called hemolymph, which is a sticky fluid, similar to your blood, that flows throughout an ant's body.

[6] After the hemolymph pumps up the pad, some of it leaks outside the pad, which is how ants can stick to a wall or a ceiling. However, when an ant picks up its foot, its leg muscles contract and suck most of the fluid back into the pad and then back up the leg. This way an ant's blood is reused over and over — pumped from the leg into the pad, then sucked back up the leg — so none is left behind.
(1)

[7] Ants are feather-light, so six sticky pads are enough to hold them against the pull of
(2)
gravity on any surface. In fact, at home in their underground chambers, ants use their sticky pads to sleep on the ceiling. By sleeping on the ceiling, ants avoid the rush-hour traffic of other ants on the chamber floors.

[8] As you walk, your left and right feet take turns so that one is on the ground while the other is in the air, moving forward. Ants also do this, with three on the surface and three in the air at a time.

[9] The walking pattern of ants is unique among six-legged insects. In ants, the front and back left feet are on the ground with the middle right foot, while the front and back right feet and the middle left foot are in the air. Then they switch. It is fun to try to copy this triangle pattern using three fingers on each hand. The next time you see an ant crawling up a wall, look closely and you might witness some of these fascinating features at work.
(3) (4)

(出典 https://theconversation.com/how-do-ants-crawl-on-walls-a-biologist-explains-their-sticky-spiky-gravity-defying-grip-188559 より改変引用。)

注：

claw (s) ＝かぎ爪

spine (s) ＝とげ

sticky＝粘着性のある

cushion (s) ＝クッション状のもの

jointed＝関節のある

設問 1. Choose the best answer from the words below to fill in (**a**) through (**e**). Each word can be used only once.

for, on, out, to, up

設問 2. What characteristics do ant feet have to protect their feet?

設問 3. What substance comes out of ants' feet? Answer with one English word.

設問 4. What does underlined item (1) so none is left behind mean?

設問 5. What does underlined item (2) feather-light mean?

A. being delicate
B. bright and shiny
C. correct and just
D. pale in color
E. weighing little

設問 6. Translate paragraph [8].

設問 7. What does underlined item (3) witness mean?

設問 8. What does underlined item (4) at work mean?

A. at hand　　B. being overwhelmed　　C. creating
D. functioning　　E. the location

設問 9. Describe three body characteristics that enable ants to walk on the ceiling.

設問10. Describe how the weight of ants makes their experience of the environment different from that of humans.

設問11. Choose the incorrect statement.

A. The author has been interested in the climbing abilities of ants for decades.
B. Compared to the hands of humans, ant feet have more parts.
C. Shoes are cited as a way of protecting human feet from poison.
D. Unless ants were feather-light, sticky pads might not be enough to keep them from falling.
E. The author does not mention ants' nests in the air.

Ⅱ．次の文章を読んで，下の設問に本文の内容に沿って答えよ。他の指示がない限り，記号以外の解答はすべて日本語ですること。右側に＊印のある語(句)には注がある。　(配点 86 点)

[1] The earth does not give up its secrets easily — not even in the Cradle of Humankind* in South Africa, where a wealth of fossils* relating to human evolution have been found (the Cradle of Humankind is a UNESCO World Heritage Site in South Africa that makes up a variety of fossil-bearing cave deposits, including the Sterkfontein Caves mentioned below). For decades, scientists have studied these fossils of early human ancestors and their long-lost relatives(1). Now, a dating method developed by Darryl Granger, a Purdue University geologist*, just pushed the age of some of these fossils found at the site of Sterkfontein Caves back more than a million years. This would make them older than Dinkinesh, also called Lucy, the world's most famous fossil of the genus* Australopithecus.

[2] Sterkfontein Caves were made famous by the discovery of the first adult Australopithecus, an ancient hominin, in 1936. Hominins include humans and our pre-human ancestors, but not the other great apes*. Since then, hundreds of Australopithecus fossils have been found there, including the well-known Mrs. Ples, and the nearly complete skeleton known as Little Foot. Scientists have studied Sterkfontein and other cave sites in the Cradle of Humankind for decades to develop a better understanding of human and environmental evolution over the past 4 million years.

[3] Granger is one of those scientists, working as part of an international team. Granger specializes in dating geologic deposits, including those in caves. As a doctoral student, he devised a method for dating buried cave sediments* that is now used by researchers all over the world. His previous work at Sterkfontein dated the Little Foot skeleton to about 3.7 million years old, but scientists are still debating the age of other fossils at the site.

[4] Granger and a team of scientists have discovered that not only Little Foot, but all of the Australopithecus-bearing cave sediments date from about 3.4 to 3.7 million years old, rather than 2.0 to 2.5 million years old as scientists previously thought. That age(2) places these fossils toward the beginning of the Australopithecus era, rather than near the end. Dinkinesh, who is from Ethiopia, is 3.2 million years old, and her species, Australopithecus africanus, one of several in the Australopithecus genus, goes back to about 3.9 million years old.

[5] Sterkfontein is a deep and complex cave system that preserves a long history of hominin occupation of the area. Understanding the dates of the fossils here can be difficult as rocks and bones fell to the bottom of a deep hole in the ground, and there are few ways to date such mixed up cave sediments. In East Africa, where many hominin fossils have been found, the Great Rift Valley volcanoes lay down layers of ash that can be dated. Researchers use those layers to estimate how old a fossil is. In South Africa — especially in a cave — the scientists do not have that luxury.(3) They typically use other animal fossils found around the bones or calcite flowstone* deposited in the cave to estimate their age. However, bones can shift in the cave, making those methods potentially incorrect. A more accurate method is to date the actual rocks in which the fossils were found. The concrete-like matrix that holds the fossil, called breccia, is the material Granger and his team analyze.

[6] "Sterkfontein has more Australopithecus fossils than anywhere else in the world," Granger said. "But it's hard to get a good date on them. People have looked at the animal fossils found near them and compared the ages of cave features like flowstones and gotten a range of different dates. What our data do is (to) resolve these controversies. It shows that these fossils are old — much older than we (**a**) thought."

[7] Radioactive cosmogenic nuclides* are extremely rare isotopes produced by cosmic rays — high-energy particles that constantly hit the earth. Granger and the research group at the Purdue Rare Isotope Measurement Laboratory (PRIME Lab) used accelerator mass spectrometry* to measure these nuclides in the rocks, as well as geologic mapping and an intimate understanding of how cave sediments pile up to determine the age of the Australopithecus-bearing sediments at Sterkfontein, and see what they can reveal about the history of fossils and geological features. The incoming cosmic rays have enough energy to cause nuclear reactions inside rocks at the ground surface, creating new, radioactive isotopes within the mineral crystals. An example is aluminum-26: aluminum that is missing a neutron* and slowly decays to turn into magnesium over a period of millions of years. Since aluminum-26 is formed when a rock is exposed at the surface, but not after it has been deeply buried in a cave, PRIME lab researchers can date cave sediments (and the fossils within them) by measuring levels of aluminum-26 paired with another cosmogenic nuclide, beryllium-10.

[8] In addition to the new dates at Sterkfontein based on cosmogenic nuclides, the research team made careful maps of the cave deposits and showed how animal fossils of different ages would have been mixed together during excavations in the 1930s and 1940s, leading to decades of confusion with the previous ages. "What (**b**) that this dating method gives reliable results," Granger said. "Using this method, we can more accurately (**c**) ancient humans and their relatives in the correct time periods, in Africa, and elsewhere across the world."

[9] The age of the fossils matters because it influences scientists' understanding of the living landscape of the time. How and where humans evolved, how they fit into the ecosystem, and who their closest relatives are and were, are pressing(4) and complex questions. Putting the fossils at Sterkfontein into their proper context is one step towards solving the entire puzzle(5).

(出典 https://www.purdue.edu/newsroom/releases/2022/Q2/fossils-in-the-cradle-of-humankind-may-be-more-than-a-million-years-older-than-previously-thought.html より改変引用。)

注：

Cradle of Humankind＝人類のゆりかご

fossil(s)＝化石

geologist＝地質学者

genus＝属(種の一つ上の分類)。例えば，Australopithecus という属には africanus を含む様々な種が属する。二名法で表記される学名は属名と種名から成るが，Australopithecus africanus では Australopithecus は属名，africanus は種名である。

ape(s)＝類人猿

sediment(s)＝堆積物

calcite flowstone＝方解石(炭酸カルシウムの鉱物)の流れ石

radioactive cosmogenic nuclide(s)＝宇宙線生成放射性核種(宇宙線によって生成された放射性核種)

accelerator mass spectrometry＝加速器質量分析

neutron＝中性子

設問 1. Explain underlined item long-lost relatives.
(1)

設問 2. What age does underlined item That age mean?
(2)

A. 2.0 to 2.5 million years ago

B. 3.2 to 3.4 million years ago

C. 3.4 to 3.7 million years ago

D. 3.9 to 4.0 million years ago

E. 4.0 million years ago or older

設問 3. Explain the difficulties in examining the date of fossils found in the Sterkfontein Cave System.

設問 4. What does underlined item that luxury refer to?
(3)

設問 5. Choose the best word to fit (**a**).

A. consequently　　B. immediately　　C. originally

D. simultaneously　　E. surprisingly

設問 6. Explain the advantage of using cosmogenic nuclides for dating fossils.

設問 7. Put (1) to (7) below in order to complete the sentence, "What (**b**) that this dating method gives reliable results."

(1) convinces　(2) hope　(3) I　(4) is

(5) people　(6) that　(7) this

設問 8. Describe the main problem related to early- to mid-20th century excavation mapping and what occurred as a result.

設問 9. Choose the best answer to fit (**c**).

A. place　B. plan　C. plane　D. play　E. pull

設問10. What does underlined item pressing mean?
(4)

A. applying pressure　　B. attractive　　C. critical

D. printing　　E. stressful

設問11. What does underlined item the entire puzzle (5) mean?

設問12. Choose the correct answer based on the statements (I) and (Ⅱ) below.

(I) The application of Granger's dating technique can be used outside of Africa.

(Ⅱ) Layers of ash from the Great Rift Valley volcanoes shift ancient bones in nearby caves.

A. (I) is correct, (Ⅱ) is false.

B. (Ⅱ) is correct, (I) is false.

C. Both (I) and (Ⅱ) are correct.

D. Both (I) and (Ⅱ) are false.

設問13. Choose the incorrect statement.

A. Researchers may use aluminum-26 and beryllium-10 to date cave sediments.

B. Sterkfontein Cave sediments turned out to be older than the scientists expected.

C. Fossils of other animals may be studied to determine the age of human fossils.

D. Bones may not stay in one place when buried in sediments.

E. Granger's dating method put an end to debates on the ages of fossils.

Ⅲ．以下は，1996年のノーベル文学賞受賞者でポーランドの詩人ヴィスワヴァ・シンボルスカの受賞記念講演の一部です。この文章を，あなたの解釈がわかるように英訳しなさい。（配点40点）

インスピレーションとは詩人の特権ではありません。インスピレーションの訪れを感じられるある種の人たちは今もいますし，過去にもいました。将来もそういう人たちはずっと存在し続けるでしょう。意識的に自分の仕事を選び取り，想像力を持ってその仕事を遂行する人なら，誰でもそうなのです。

そういった仕事は，そこにつねに新たなチャレンジがあると気づきさえすれば，絶えることのない冒険にもなり得るでしょう。

インスピレーションとは，それが実際に何であれ，不断の「私は知らない」から生まれてきます。

（出典：ヴィスワヴァ・シンボルスカ『終わりと始まり』沼野充義訳［未知谷］より改変引用。）