英 1

英　　語

問題Ⅰ

次の英文を読み、空欄に対する最も適した答えをそれぞれ選び、記号で答えよ。

Octopuses have blue blood, three hearts and a doughnut-shaped brain. But these aren't even the most unusual things about them! Known for their otherworldly look and remarkable intelligence, octopuses continue to reveal astonishing qualities, abilities and behavior.

It's a well-known fact that octopuses have eight arms. But did you know that each arm contains its own 'mini brain'?

This enables octopuses to complete tasks with their arms more quickly and effectively. Moreover, while each arm is capable of acting independently, the centralized brain is also able to exert top-down control.

This was proven experimentally in 2011 when researchers tested whether an octopus could learn to guide one of its arms through a maze to reach food. The maze was designed so that the arm would have to leave water, and so not be able to use its chemical sensors to find the food. Transparent walls enabled the octopus to see the food. Most of the octopuses were eventually successful at guiding their arm to the food, proving that the central brain, which processed the visual information, could control the arm.

Thanks to their nine brains, it seems that octopuses have the benefit of both localized and centralized control over their actions.

Scientists use the size of an animal's brain relative to its body as a rough guide to its intelligence, as it gives an indication of how much an animal is 'investing' in its brain. It's not a perfect measure, as other factors such as the degree of folding in the brain also play a role, but smarter animals tend to have a higher brain-to-body ratio.

An octopus's brain-to-body ratio is the largest of any invertebrate. It's also larger than many vertebrates, although not mammals. Octopuses have about as many

neurons as a dog, the common octopus (*Octopus vulgaris*) has around 500 million. About two thirds are located in its arms. The rest are in the doughnut-shaped brain, which is wrapped around the esophagus and located in the octopus's head.

Octopuses have demonstrated intelligence in a number of ways, says Jon Ablett, the curator of the natural history museum's octopus collection. "In experiments they've solved mazes and completed tricky tasks to get food rewards. They're also adept at getting themselves in and out of containers."

There are also intriguing anecdotes about octopuses' abilities and mischievous behavior. "I remember reading one about a lab where all the fish were going missing from their tank," says Jon. "The staff set up a little video camera and it turned out that one of the octopuses was getting out of its tank, going to the other tank, opening it, eating the fish, closing the lid, going back to its own tank and hiding the evidence."

There is footage of similar sneaky behavior and ingenious problem-solving happening in the wild. For example, a BBC video shows a giant Pacific octopus (*Enteroctopus dofleini*) poaching crabs from a fisherman's pot.

Meanwhile, the sneaky larger Pacific striped octopus uses scare tactics when hunting for its dinner. It creeps up to its prey, such as a shrimp, and taps it on its shoulder. More often than not, the startled shrimp leaps away from the arm that touched it and darts into the clutches of the waiting octopus. It's handy having seven additional arms.

Tools use is relatively rare in the animal kingdom and is something we tend to associate with apes, monkeys, dolphins and some birds (particularly crows and parrots). It is a good indicator of the ability to learn. Among invertebrates, only octopuses and a few insects are known to use tools.

Jon elaborates, "As well as solving tasks using tools to get food rewards in the lab, in the wild octopuses have been shown to build little dens, and to use stones to create sort of shields to protect the entrance. They pile up anything they can find—rocks, broken shells, even broken glass and bottle caps."

Small individuals of the common blanket octopus (*Tremoctopus violaceus*) carry tentacles from the Portuguese man-of-war as a weapon. These tentacles carry a potent and painful venom—the common blanket octopus is immune but can inflict their effects on unwitting predators and prey.

The most impressive and convincing example of tool use by octopuses came in 2009, when a few veined octopus (*Amphioctopus marginatus*) individuals were observed collecting discarded coconut shells in Indonesia. After they dug up the shells, the octopuses gave them a good clean with jets of water. They then carried them to a new location and assembled them as a shelter. Travelling with the shells underneath their body resulted in a slow and ungainly 'stilt walk' along the seafloor.

This makes the octopuses more vulnerable to predators, but it seems they are willing to accept the short-term risk for future protection. The scientists who discovered the behavior argue that this, and the fact the shells are carried around to be used when needed, is conclusive evidence of genuine tool use.

Adapted from

Hendry, Lisa. "Octopuses keep surprising us—here are eight examples how"

Natural History Museum

https://www.nhm.ac.uk/discover/octopuses-keep-surprising-us-here-are-eight-examples-how.html

1. Octopuses have _____.

A. only one large brain, which is shaped like a doughnut

B. one large brain and two smaller brains

C. one large brain, several hearts and a few arms

D. one large brain, three hearts and eight mini brains

2．Octopuses are exceptional animals because their _____.

A．numerous hearts give them lots of courage

B．blue blood allows them to camouflage in with their environment

C．arms can act autonomously without direction from the large, central brain

D．large brain is able to exert sole control over their many limbs

3．The 2011 octopus experiment showed that _____.

A．its central brain could control each individual arm

B．it was unable to visually guide its arms

C．the octopus's arms were only controlled by the mini brains

D．the function of the mini brains had priority over the function of the central brain

4．According to the article, the octopus has _____.

A．the largest brain-to-body ratio of all animals

B．the largest brain-to-body ratio of all invertebrates

C．made the smallest investment in its brain

D．made significant investments in its body size

5．There are around _____ neurons in the common octopus's arms.

A．one billion

B．one billion five hundred million

C．three hundred thirty-three million

D．a few hundred thousand

6. Octopus intelligence has been demonstrated by its ability to _____.

A. climb around inside its tank and eat the fish there

B. climb out of its tank and eat with the fish in nearby tanks

C. open and close lids to hide evidence of predatory behavior

D. cooperate with animals adjacent to it in order to get food

7. Dinner strategies that some octopuses use include _____.

A. sharing crabs with fishermen taken from pots

B. frightening prey with their arms so that the prey runs towards them

C. using their tentacles to deliver poison to predators

D. leaping away from prey such as shrimp

8. Like apes, birds, monkeys and dolphins, the wild octopus has an exceptional ability to learn because it _____.

A. has numerous stones that it uses for construction purposes

B. has many different homes that it uses as safehouses

C. can use tools to increase its chances of survival

D. can use tools for drunken walking along the seafloor

9. The veined octopus gambles its life in the short term for _____.

A. long-term defense

B. mid-term gains

C. short-term payoffs

D. involuntary work

10. The author of the article _____.

A．is impressed by the octopus's superior levels of intelligence

B．is frightened by the devious behavior of invertebrates

C．has a fascination with all sea creatures

D．belittles the octopus because its brain is smaller than mammal's brains

問題Ⅱ

次の各文の（　　）から、最も適した語句を選び、記号で答えよ。

11. Please wait at the station until Susan（A．comes　B．will come　C．came D．had come）.

12. Hiroshi （A．was speaking to　B．has spoken　C．was spoken to D．will speak）in French by a stranger yesterday.

13. I couldn't go to see a doctor last Saturday because I （A．might　B．must C．will　D．had to）finish writing a report.

14. If you had taken the medicine then, you（A．might be　B．will be C．have been　D．are）better now.

15. Judy decided to leave, but Ned asked her（A．no　B．to not　C．to no D．not to）.

16. I'm not used（A．teach　B．to teaching　C．to teach　D．taught）in a large classroom.

17. He bought a camera（A．to make　B．making　C．made D．had been made）in Germany.

18. This is the second（A．longest　B．long　C．longer　D．as long as）river in Japan.

19. Tom has already spent（A．that　B．which　C．what　D．who）he earned on gambling.

20. Either you（A．and　B．nor　C．but　D．or）I should go there.

問題Ⅲ

次の各文を英語に訳しなさい。ただし（　）内の語をすべて用いることとする。（　）内では、文頭にくる語も小文字で示してある。

21. 新しい技術を導入する際には、プラスの効果だけでなくマイナスの影響も考慮することが重要である。
（consider，only）

22. 森林破壊と野生動物による農業被害との関係について、もっと議論する必要がある。
（deforestation，between）