

## 平成19年度入学者選抜個別(第2次)学力検査問題

# 外国語

### 注意事項

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2. 解答用紙は、問題冊子と別に印刷されているから、誤らないように注意しなさい。
3. 解答は、必ず解答用紙の指定された欄内に横書きで記入しなさい。
4. 各解答用紙には、受験番号欄が2または4カ所あります。それぞれ記入を忘れないこと。
5. 解答用紙は、記入の有無にかかわらず、机上に置き、持ち帰ってはいけません。問題冊子は持ち帰りなさい。
6. 問題冊子は、全部で8ページであり、第1～3ページは下書用紙です。下書用紙は切り離してはいけません。
7. 問題および語句の注は、第4ページと第5ページの間に、はさみこんであります。
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## 外 国 語

次の英文は新聞 *New York Times* (2005年12月13日)に掲載された、William J. Broad 氏の記事 “It’s Sensitive. Really.” を一部改変したものです。この文章をよく読んで、問題 1 から 6 に答えなさい。

解答は解答用紙の指定された欄に記入すること。

\*印のついている語句の注は、問題のあとに示されています。

For centuries, the tusk\* of the narwhal\* has fascinated and baffled. The word narwhal (pronounced NAR-wall or NAR-way-l) is said to derive from words meaning “corpse whale,” apparently because the animal’s coloring reminded people of the color of drowned sailors.

Narwhal tusks, up to nine feet long, were sold as unicorn horns in ages past, often for many times their weight in gold since they were said to possess magic powers. In the 16th century, Queen Elizabeth received a tusk valued at the cost of a castle.

Scientists have long tried to explain why a whale that lives in arctic waters, *feeding* on fish that live around the ice, should have such a long tusk. The theories about how the narwhal uses the tusk have included breaking ice, spearing fish, piercing ships, transmitting sound, shedding excess body heat, poking the seabed for food, attracting females, defending baby narwhals and establishing authority.

But a team of scientists from Harvard and the National Institute of Standards and Technology has now made a surprising discovery: the tusk, it turns out, forms a sensory organ of exceptional size and sensitivity, making it one of the planet’s most *remarkable*. The find came when the team used an electron microscope to examine the tusk and found new subtleties of dental anatomy. The close-ups showed that 10 million nerve endings lead from the tusk’s core toward its outer surface, communicating with the outside world. The scientists say the nerves can

*detect* subtle changes of temperature, pressure and probably much else.

Today, Dr. Nweeia is presenting the team's findings at a professional conference. James G. Mead, of the Smithsonian Institution in Washington, where Dr. Nweeia is a research associate, said the exposed nerve endings appear to be unique in nature. Dr. Mead said, "It's something new. It just goes to show just how little we know about whales and dolphins." He noted that no theory about the tusk's function has ever considered its use as a sensory organ.

In the Canadian wilds, the team recently conducted a study on a captured narwhal. Changes in the amount of salt around the animal's tusk produced signs of altered brain waves, giving preliminary support to the sensor hypothesis. The unharmed whale was then released. The team is now working to understand how the narwhal uses the information. One theory is that the tusk can detect salt levels that tell if ice is freezing, a hazard that has killed hundreds of narwhals. Tusk readings may also help the whales *track* environments that favor their preferred foods.

Little about the narwhal's appearance or behavior offers *clues* to the tusk's sensory importance. The whale has eyes, though small ones. It also has a thick layer of fat and no fin on the top of its body, so it can swim easily under the ice. Like any whale, it must *surface* occasionally to breathe air. And as in dolphins, its<sup>(2)</sup> mouth looks like it is always smiling.

Though shy of humans, the animals are quite social. They often travel in groups of 20 or 30. Males weigh up to 1.5 tons, grow about 15 feet long and are *conspicuous* by their tusks, which can grow from six to nine feet in length. A few females have tusks and, in rare cases, narwhals can have two of the long teeth. Though often perfectly straight, the tusks always grow in tight spirals.

Narwhals live mainly in the icy channels of northern Canada and northwestern Greenland, but they are found eastward as far as Siberia. The whale's close cousin, the snowy white beluga\*, lives happily in captivity. The shy narwhal tends to die.

Arctic explorers have often observed them at a distance because narwhals

frequently raise their heads above the water, their tusks held high. Jens Rosing, in his book, tells of seeing them during expeditions off Greenland. There the whales would play and apparently mate. “Over a hundred can be seen at once,” he wrote. “They often rise vertically out of the water, lifting themselves with strong movements of their tail fin so that half their body is above water.”

Around 1000 A.D., the narwhal tusk entered history as a *profitable* lie. Dishonest traders passed them off as one of the most prized objects of all time: unicorn horns. The ancient Chinese, Greeks, Romans and other peoples had accepted the unicorn as real, and the arrival of the beautifully spiraled objects seemed to prove the animal's existence. The supposed horns sparked huge interest because they were said to have the power to cure ills and neutralize poisons. Kings and emperors, eager to prevent *assassination*, had cups and eating utensils made of the precious horns. A London doctor advertised a drink made from powdered tusks that could supposedly cure many ills.

The horns became a symbol of power, both earthly and divine, in part because of their religious associations. In medieval times, the unicorn was seen as a symbol of great purity and of Christ. The fantastic beast appeared in many thousands of images. One author and explorer wrote, “All carry a horn that is unmistakably a narwhal tusk, the only long, spiraled horn in all creation.” Churches put small pieces of “unicorn horn” in holy water, giving sick people hope of miracle cures.

By the 17th century, the deception began to falter with the expansion of New World exploration and multiplying reports of strange whales that had long tusks. A Danish zoologist investigated and in 1638 exposed the horn's true origins in a public lecture. As the unicorn myth died a slow death, the reputation of the narwhal grew larger than life. Explorers claimed its tusk could punch holes in thick ice, and that males battled with their long tusks.

Eight years ago, Dr. Nweeia began to wonder about narwhals and their tusks. “They defied most of the principles and properties of teeth,” he recalled. In 2000, he decided to investigate the animal closely and first went to its icy home in 2002.

There he met an Inuit\*guide. Under international agreement, the Inuits are allowed to hunt narwhals, which they eat and harvest for their tusks. During expeditions in 2003 and 2004, Dr. Nweeia was able to gather head and tusk samples, which he brought back for analysis. He and his colleagues tracked a clear nerve connection between the animal's brain and tusk, finding the long tooth heavily supplied with nerves. But why it should be so remained a mystery.

Rough deposits of calcified algae and plankton coated the outside of the tusks. The scientists decided to remove them in an acid bath to get down to the surface of the tooth before viewing it under an electron microscope. First, however, they decided to give the uncleaned tusk a quick microscopic examination.

It was a shock. There, contrary to all known rules of tooth anatomy, they found open tubes leading down through the coating to the tooth's inner nerves. "That surprised us," recalled Frederick C. Eichmiller. "Tubes in healthy teeth never go to the surface." Extrapolating from a count of open tubes over one part of the tooth's surface, the team estimated that the average narwhal tusk had millions of openings that led down to inner nerves. "No one knew that they were connecting to the outside environment," Dr. Nweeia said. "To find that was extraordinary."

The scientists, noting that the males often hold their tusks high in the air, wonder if the long teeth might sometimes serve as sophisticated weather stations, letting the animals sense changes in temperature and air pressure that would tell of the arrival of cold weather and the likelihood that open ice channels might soon freeze up.

The discovery does not eliminate some early theories of the narwhal's behavior. Tusks acting as sophisticated sensors, Dr. Nweeia said, may still play a role in mating rituals or determining male hierarchies. He added that the nerve endings, in addition to other readings, undoubtedly produce sensations when the tusk is rubbed or touched, and that these might be pleasurable. This tactile sense might explain why narwhals engage in what is known as "tusking," where two males gently rub tusks together, Dr. Nweeia said. He added that the Inuit seldom report

aggressive contact, weakening ideas of battle. Dr. Nweeia said that gentle tusking might also be a way that males clean their tusks so tubes stay open, allowing them to better function as sensors.

<sup>(1)</sup> He called the basic discovery amazing, especially given the freezing temperatures of the Arctic. “This is one of the last places you’d expect to find such a thing,” Dr. Nweeia said of the large sensory organs. “Cold is one of the things that the tubes are most sensitive to,” as people sometimes discover when diseased gums of human teeth expose the tubes. “Of all the places you’d think you’d want to do the most to protect yourself from that outside environment,” he said, “this guy has gone out of his way to open himself up to it.”

# 問題および注

## 問題

1 The following words appear in italics in the text. On the answer sheet, circle the letter indicating the best definition for each italicized word (based on how the word is used in the text).

*possess*

- |              |            |            |
|--------------|------------|------------|
| a) lose      | b) have    | c) attract |
| d) eliminate | e) conceal |            |

*feeding*

- |               |            |               |
|---------------|------------|---------------|
| a) protecting | b) chasing | c) preferring |
| d) eating     | e) luring  |               |

*remarkable*

- |                  |                |              |
|------------------|----------------|--------------|
| a) common        | b) educational | c) dangerous |
| d) extraordinary | e) useful      |              |

*detect*

- |           |           |          |
|-----------|-----------|----------|
| a) ignore | b) create | c) sense |
| d) change | e) hide   |          |

*track*

- |            |            |             |
|------------|------------|-------------|
| a) control | b) monitor | c) preserve |
| d) prevent | e) protect |             |

*clues*

- |              |             |            |
|--------------|-------------|------------|
| a) hints     | b) insights | c) beliefs |
| d) drawbacks | e) proof    |            |

*surface*

- |             |          |          |
|-------------|----------|----------|
| a) inhale   | b) lunge | c) creep |
| d) submerge | e) rise  |          |

*conspicuous*

- a) invisible                      b) splendid                      c) noticeable  
d) anomalous                      e) weird

*profitable*

- a) gainful                      b) blatant                      c) obvious  
d) economical                      e) harmless

*assassination*

- a) disease                      b) misfortune                      c) war  
d) unrest                      e) murder

**2** *What do the following words, which are underlined in the text, refer to? Answer using one or two English words.*

- (1) their
- (2) its
- (3) animal's
- (4) they
- (5) tooth's

**3** *According to the text, decide whether the following statements are true (T) or false (F) and for each statement circle the correct answer on the answer sheet.*

- (1) The narwhal's color may be the origin of its name.
- (2) Narwhal tusks usually grow to at least nine feet in length.
- (3) The narwhal's primary food is fish.
- (4) Until recently, there have been very few theories as to how the narwhal uses its tusk.
- (5) There are many animals which, like the narwhal, use exposed nerve endings to understand and sense their environment.

- (6) Scientists found evidence of brain activity that seemed to indicate the narwhal tusk is sensitive to the amount of salt in the water around it.
- (7) Recent scientific research has proven that the narwhal's tusk helps it find food and survive freezing ice.
- (8) Narwhals are solitary creatures, tending to swim alone.
- (9) Narwhals can only be found in the channels of northern Canada and northwestern Greenland.
- (10) The narwhal is difficult to keep in captivity.
- (11) Narwhals are so afraid of humans that it is difficult to observe them, even from a distance.
- (12) According to the article, a London doctor advertised a medicine made from powdered tusks.
- (13) In medieval art, the unicorn was a symbol of purity.
- (14) The narwhal is one of only three animals on earth known to have a long, spiraled horn.
- (15) When the true origin of the "unicorn" horn was disclosed, the reputation of the narwhal went up.
- (16) Consistent with international agreements, the Inuit still hunt the narwhal for food and tusks.
- (17) Dr. Nweeia and his colleagues discovered that there were millions of open tubes in the tusk that led down to the nerves inside.
- (18) The Inuit have rarely reported seeing narwhals battle with their tusks.
- (19) Scientists long ago proved that narwhals use their tusks for breaking ice and spearing fish.
- (20) The article implies that unicorns actually existed in ancient times.

**4** **BRIEFLY** (5 to 20 words) *answer the following questions in your own words, using complete English sentences.*

- (1) Explain what microscopic examination revealed about the narwhal tusk.
- (2) Explain why kings used cups and eating utensils made of “unicorn horns.”
- (3) Explain what “tusking” is and why narwhals might engage in it.

**5** 下線部(ア)と(イ)を日本語に訳しなさい。

**6** この文章で説明されている、イッカククジラの牙をめぐるこれまでの諸説と、最近の発見、またその発見に基づく仮説とを、300字以内で要約しなさい。

注

|                    |                    |
|--------------------|--------------------|
| Inuit              | イヌイット族。北米北端部などに住む。 |
| narwhal            | イッカククジラ            |
| snowy white beluga | シロイルカ、ベルーガ         |
| tusk               | 牙(きば)              |