# **DURATION: 40 MINUTES**

# ****READING TEST****

## Fatal Attraction

Evolutionist Charles Darwin first marveled at flesh-eating plants in the mid-19th century. Today, biologists, using 21st-century tools to study cells and DNA, are beginning to understand how these plants hunt, eat and digest - and how such bizarre adaptations arose in the first place.

A

The leaves of the Venus flytrap plant are covered in hairs. When an insect brushes against them, this triggers a tiny electric charge, which travels down tunnels in the leaf and opens up pores in the leaf's cell membranes. Water surges from the cells on the inside of the leaf to those on the outside, causing the leaf to rapidly flip in shape from convex to concave, like a soft contact lens. As the leaves flip, they snap together, trapping the insect in their sharp-toothed jaws.

B

The bladderwort has an equally sophisticated way of setting its underwater trap. It pumps water out of tiny bag-like bladders, making a vacuum inside. When small creatures swim past, they bend the hairs on the bladder, causing a flap to open. The low pressure sucks water in, carrying the animal along with it. In one five-hundredth of a second, the door swings shut again. The Drosera sundew, meanwhile, has a thick, sweet liquid oozing from its leaves, which first attracts insects, then holds them fast before the leaves snap shut. Pitcher plants use yet another strategy, growing long tube-shaped leaves to imprison their prey. Raffles' pitcher plant, from the jungles of Borneo, produces nectar that both lures insects and forms a slick surface on which they can't get a grip. Insects that land on the rim of the pitcher slide on the liquid and tumble in.

C

Many carnivorous plants secrete enzymes to penetrate the hard exoskeleton of insects so they can absorb nutrients from inside their prey. But the purple pitcher plant, which lives in bogs and infertile sandy soils in North America, enlists other organisms to process its food. It is home to an intricate food web of mosquito larvae, midges and bacteria, many of which can survive only in this unique habitat. These animals shred the prey that fall into the pitcher, and the smaller organisms feed on the debris. Finally, the plant absorbs the nutrients released.

D

While such plants clearly thrive on being carnivorous, the benefits of eating flesh are not the ones you might expect. Carnivorous animals such as ourselves use the carbon in protein and the fat in meat to build muscles and store energy. Carnivorous plants instead draw nitrogen, phosphorus, and other critical nutrients from their prey in order to build light-harvesting enzymes. Eating animals, in other words, lets carnivorous plants do what all plants do: carry out photosynthesis, that is, grow by harnessing energy directly from the sun.

E

Carnivorous plants are, in fact, very inefficient at converting sunlight into tissue. This is because of all the energy they expend to make the equipment to catch animals – the enzymes, the pumps, and so on. A pitcher or a flytrap cannot carry out much photosynthesis because, unlike plants with ordinary leaves, they do not have flat solar panels that can grab lots of sunlight. There are, however, some special conditions in which the benefits of being carnivorous do outweigh the costs. The poor soil of bogs, for example, offers little nitrogen and phosphorus, so carnivorous plants enjoy an advantage over plants that obtain these nutrients by more conventional means. Bogs are also flooded with sunshine, so even an inefficient carnivorous plant can photosynthesise enough light to survive.

F

Evolution has repeatedly made this trade-off. By comparing the DNA of carnivorous plants with other species, scientists have found that they evolved independently on at least six separate occasions. Some carnivorous plants that look nearly identical turn out to be only distantly related. The two kinds of pitcher plants - the tropical genus Nepenthes and the North American Sarracenia - have, surprisingly, evolved from different ancestors, although both grow deep pitchershaped leaves and employ the same strategy for capturing prey.

G

In several cases, scientists can see how complex carnivorous plants evolved from simpler ones. Venus flytraps, for example, share an ancestor with Portuguese sundews, which only catch prey passively, via 'flypaper' glands on their stems. They share a more recent ancestor with Drosera sundews, which can also curl their leaves over their prey. Venus flytraps appear to have evolved an even more elaborate version of this kind of trap, complete with jaw-like leaves.

H

Unfortunately, the adaptations that enable carnivorous plants to thrive in marginal habitats also make them exquisitely sensitive. Agricultural run-off and pollution from power plants are adding extra nitrogen to many bogs in North America. Carnivorous plants are so finely tuned to low levels of nitrogen that this extra fertilizer is overloading their systems, and they eventually burn themselves out and die.

Humans also threaten carnivorous plants in other ways. The black market trade in exotic carnivorous plants is so vigorous now that botanists are keeping the location of some rare species a secret. But even if the poaching of carnivorous plants can be halted, they will continue to suffer from other assaults. In the pine savannah of North Carolina, the increasing suppression of fires is allowing other plants to grow too quickly and outcompete the flytraps in their native environment. Good news, perhaps, for flies. But a loss for all who, like Darwin, delight in the sheer inventiveness of evolution.

### Questions 01- 13

Complete the notes below. Choose ***NO MORE THAN TWO WORDS*** from the passage for each answer.

**How a Venus flytrap traps an insect**

• Insect touches **01**  on leaf of plant

• Small **02**  passes through leaf

• **03**  in cell membrane open

• Outside cells of leaves fill with **04** 

• Leaves change so that they have a **05**  shape and snap nut

Look at the following statements (Questions **06-09**) and the list of plants. Match each statement with the correct plant, **A. B. C, D or E.**

Write the correct letter, **A, B, C, D or E**, in boxes **06-09** on your answer sheet.

**06**  It uses other creatures to help it digest insects

**07**  It produces a slippery substance to make insects fall inside it.

**08**  It creates an empty space into which insects are sucked.

**09**  It produces a sticky substance which traps insects on its surface.

|  |  |
| --- | --- |
|  | List of plants |
| **A** | Venus flytrap |
| **B** | bladderwort |
| **C** | Drosera sundew |
| **D** | Raffles’ pitcher plant |
| **E** | purple pitcher plant |

Reading Passage 2 has nine paragraphs,**A-l**.

Which paragraph contains the following information?

**10**  a mention of a disadvantage of the leaf shape of some carnivorous plants

**11**  an example of an effort made to protect carnivorous plants

**12**  unexpected information about the origins of certain carnivorous plants

**13**  an example of environmental changes that shorten the life cycles of carnivorous plants

**Communication in science**

A

Science plays an increasingly significant role in people’s lives, making the faithful communication of scientific developments more important than ever. Yet such communication is fraught with challenges that can easily distort discussions, leading to unnecessary confusion and misunderstandings.

B

Some problems stem from the esoteric nature of current research and the associated difficulty of finding sufficiently faithful terminology. Abstraction and complexity are not signs that a given scientific direction is wrong, as some commentators have suggested, but are instead a tribute to the success of human ingenuity in meeting the increasingly complex challenges that nature presents. They can, however, make communication more difficult. But many of the biggest challenges for science reporting arise because in areas of evolving research, scientists themselves often only partly understand the full implications of any particular advance or development. Since that dynamic applies to most of the scientific developments that directly affect people’s lives global warming, cancer research, diet studies – learning how to overcome it is critical to spurring a more informed scientific debate among the broader public.

C

Ambiguous word choices are the source of some misunderstandings. Scientists often employ colloquial terminology, which they then assign a specific meaning that is impossible to fathom without proper training. The term “relativity,” for example, is intrinsically misleading. Many interpret the theory to mean that everything is relative and there are no absolutes. Yet although the measurements any observer makes depend on his coordinates and reference frame, the physical phenomena he measures have an invariant description that transcends that observer’s particular coordinates. Einstein’s theory of relativity is really about finding an invariant description of physical phenomena. True, Einstein agreed with the idea that his theory would have been better named “Invarianten theorie.” But the term “relativity” was already entrenched at the time for him to change.

D

“The uncertainty principle” is another frequently abused term. It is sometimes interpreted as a limitation on observers and their ability to make measurements.

E

But it is not about intrinsic limitations on any one particular measurement; it is about the inability to precisely measure particular pairs of quantities simultaneously? The first interpretation is perhaps more engaging from a philosophical or political perspective. It’s just not what the science is about.

F

Even the word “theory” can be a problem. Unlike most people, who use the word to describe a passing conjecture that they often regard as suspect, physicists have very specific ideas in mind when they talk about theories. For physicists, theories entail a definite physical framework embodied in a set of fundamental assumptions about the world that lead to a specific set of equations and predictions – ones that are borne out by successful predictions. Theories aren’t necessarily shown to be correct or complete immediately. Even Einstein took the better part of a decade to develop the correct version of his theory of general relativity. But eventually both the ideas and the measurements settle down and theories are either proven correct, abandoned or absorbed into other, more encompassing theories.

G

“Global warming” is another example of problematic terminology. Climatologists predict more drastic fluctuations in temperature and rainfall – not necessarily that every place will be warmer. The name sometimes subverts the debate, since it lets people argue that their winter was worse, so how could there be global warming? Clearly “global climate change” would have been a better name. But not all problems stem solely from poor word choices. Some stem from the intrinsically complex nature of much of modern science. Science sometimes transcends this limitation: remarkably, chemists were able to detail the precise chemical processes involved in the destruction of the ozone layer, making the evidence that chlorofluorocarbon gases (Freon, for example) were destroying the ozone layer indisputable.

H

A better understanding of the mathematical significance of results and less insistence on a simple story would help to clarify many scientific discussions. For several months, Harvard was tortured months, Harvard was tortured by empty debates over the relative intrinsic scientific abilities of men and women. One of the more amusing aspects of the discussion was that those who believed in the differences and those who didn’t use the same evidence about gender-specific special ability? How could that be? The answer is that the data shows no substantial effects. Social factors might account for these tiny differences, which in any case have an unclear connection to scientific ability. Not much of a headline when phrased that way, is it? Each type of science has its own source of complexity and potential for miscommunication. Yet there are steps we can take to improve public understanding in all cases. The first would be to inculcate greater understanding and acceptance of indirect scientific evidence. The information from an unmanned space mission is no less legitimate than the information from one in which people are on board.

I

This doesn’t mean questioning an interpretation, but it also doesn’t mean equating indirect evidence with blind belief, as people sometimes suggest. Second, we might need different standards for evaluating science with urgent policy implications than research with the purely theoretical value. When scientists say they are not certain about their predictions, it doesn’t necessarily mean they’ve found nothing substantial. It would be better if scientists were more open about the mathematical significance of their results and if the public didn’t treat math as quite so scary; statistics and errors, which tell us the uncertainty in a measurement, give us the tools to evaluate new developments fairly.

J

But most important, people have to recognize that science can be complex. If we accept only simple stories, the description will necessarily be distorted. When advances are subtle or complicated, scientists should be willing to go the extra distance to give proper explanations and the public should be more patient about the truth. Even so, some difficulties are unavoidable. Most developments reflect work in progress, so the story is complex because no one yet knows the big picture.

**Questions 14-18**

Choose the correct letter **A, B, C or D.**

Write your answers in boxes **14-18** on your answer sheet.

**14**

Why faithful science communication important?

* **A** Science plays an increasingly significant role in people’s lives.
* **B** Science is fraught with challenges public are interested in.
* **C** The nature of complexity in science communication leads to confusion.
* **D** Scientific inventions are more important than ever before.

**15**

what is the reason that the author believes for the biggest challenges for science reporting?

* **A** phenomenon such as global warming, cancer research, diet studies is too complex.
* **B** Scientists themselves often only partly understand the Theory of Evolution
* **C** Scientists do not totally comprehend the meaning of certain scientific evolution
* **D** Scientists themselves often partly understand the esoteric communication nature

**16**

According to the 3rd paragraph, the reference to the term and example of “theory of relativity” is to demonstrate

* **A** theory of relativity is about an invariant physical phenomenon
* **B** common people may be misled by the inaccurate choice of scientific phrase
* **C** the term “relativity,” is designed to be misleading public
* **D** everything is relative and there is no absolutes existence

**17**

Which one is a good example of appropriate word choice:

* **A** Scientific theory for the uncertainty principle
* **B** phenomenon of Global warming
* **C** the importance of ozone layer
* **D** Freon’s destructive process on environmental

**18**

What is a surprising finding of the Harvard debates in the passage?

* **A** There are equal intrinsic scientific abilities of men and women.
* **B** The proof applied by both sides seemed to be of no big difference.
* **C** The scientific data usually shows no substantial figures to support a debated idea.
* **D** Social factors might have a clear connection to scientific ability.

Do the following statements agree with the information given in Reading Passage ?

In boxes**19-20** on your answer sheet, write

|  |  |
| --- | --- |
| **TRUE** | if the statement agrees with the information |
| **FALSE** | if the statement contradicts the information |
| **NOT GIVEN** | If there is no information on this |

**19**  “Global warming” scientifically refers to greater fluctuations in temperature and rainfall rather than a universal temperature rise.

**20**  More media coverage of “global warming” would help the public to recognize the phenomenon.

**READING ANSWERS**

**01**hairs

**02**(electric) charge

**03**pores

**04**water

**05**concave

**06**E

**07**D

**08**B

**09**C

**10**E

**11**I

**12**F

**13**H

**14**A

**15**C

**16**B

**17**D

**18**B

**19**TRUE

**20**NOT GIVEN