READING PASSAGE 1

*You should spend about 20 minutes on **Questions 1–13**, which are based on Reading Passage 1 below.*

Carnivorous plants

They attract insects and then eat their flesh. Is that any way for a plant to behave?

The naturalist and author of On the Origin of Species, Charles Darwin, was fascinated by carnivorous plants. In 1860, soon after he came across his first carnivorous plant — the sundew, Drosera — he wrote, ‘I care more about Drosera than the origin of all the species in the world.’ He spent months running experiments on the plants. He dropped flies and bits of meat on their leaves and watched them slowly fold their sticky tentacles over their prey. He thought it incredible that brushing a leaf with a single strand of human hair was enough to bring about a response. Yet sundews, he observed, ignored raindrops. To react to such a false alarm, he reasoned, would obviously be a great evil to the plant. This was no accident. This was adaptation.

Darwin expanded his studies from sundews to other species in his book Insectivorous Plants. He was amazed at the quickness and power of the Venus flytrap. He showed that when one of its leaves snapped shut, it formed itself into a temporary ‘stomach’, secreting enzymes that could dissolve the prey. He noted that a leaf took more than a week to reopen after closing, and reasoned that the interlocking spines along the margin of the leaf allowed tiny insects to escape, saving the plant the expense of digesting an insufficient meal.

Today, biologists using 21st-century tools to study cells and DNA are beginning to understand how these plants hunt, eat, and digest — and how these strange adaptations came about in the first place. Alexander Volkov, a plant physiologist at Oakwood University in Alabama, believes he has figured out the Venus flytrap’s secret. ‘This,’ Volkov declares, ‘is an electrical plant.’

When an insect brushes against a hair on the leaf of a Venus flytrap, the movement sets off an electric charge. The charge builds up inside the tissue of the leaf but is not enough to stimulate the snap, which keeps the Venus flytrap from reacting to false alarms, such as raindrops. An insect, however, is likely to brush a second hair, adding enough electric charge for the leaf to close.

Volkov’s experiments reveal that the electric charge travels down fluid-filled tunnels in a leaf, which opens up pores in cell membranes. Water rushes 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 an insect inside.

The bladderwort plant has an equally sophisticated way of setting its underwater trap. It pumps water out of tiny air sacs or bladders, lowering the pressure inside. When a water flea or some other small creature swims past, it bends hairs on the bladder, causing a flap to spring apart. The low pressure sucks water in, carrying the creature along with it. In one five-hundredth of a second, the flap swings shut again. The cells in the bladder then begin to pump water out again, creating a new vacuum. Many other species of carnivorous plants act like living flypaper, catching animals on sticky tentacles. Pitcher plants use yet another strategy, growing long tube-shaped leaves into which insects fall. Some of the largest have pitchers up to 30cm deep and can consume whole frogs unlucky enough to fall into them. Sophisticated chemistry helps make the pitcher a death trap.

Nicholas Gotelli, of the University of Vermont, is trying to figure out what evolutionary forces pushed these plants towards meat. Carnivorous plants clearly benefit from eating animals; when scientists feed pitcher plants extra bugs, the plants get bigger. But the benefits of eating flesh are not the ones you might expect. Carnivorous animals, like ourselves, use the carbon in protein and the fat in meat to build muscles and store energy. Carnivorous plants, however, take nitrogen and phosphorus from the flesh in order to build light-harvesting enzymes. Eating animals, in other words, lets carnivorous plants do what all plants do: grow by taking energy directly from the sun.

Unfortunately, they do a really bad job of it. That’s because they have to use a lot of energy to make the equipment they need to catch animals — the enzymes, the pumps, the sticky tentacles, and so on. A pitcher or a flytrap is not very good at photosynthesis because, unlike plants with ordinary leaves, it does not have flat solar panels that can absorb lots of sunlight. Gotelli suspects that only under special conditions are the benefits of being carnivorous greater than the costs. The poor soil of bogs and swamps, where many carnivorous plants grow, offers little nitrogen and phosphorus, so carnivorous plants enjoy an advantage there over ‘conventional’ plants. Also, bogs are often flooded with sunshine, so even an inefficient carnivorous plant can carry out enough photosynthesis to survive. ‘They’re stuck, and they’re making the best of it,’ says Aaron Ellison of Harvard University.

Unfortunately, the adaptations that enable carnivorous plants to survive in harsh habitats also make them extremely sensitive to environmental changes. Chemical fertilizers used in agriculture and pollution from power plants are adding extra nitrogen to many bogs in North America. Carnivorous plants are so finely adapted to low levels of nitrogen that this extra fertilizer is overloading their systems. Humans also threaten carnivorous plants in other ways. The black market trade in exotic carnivorous plants is strong, but even if this can be prevented, carnivorous plants will continue to suffer from other dangers. Their habitat is disappearing, to be replaced by shopping centers and houses. The suppression of wildfires by government agencies allows other plants to grow quickly and outcompete the Venus flytraps. Good news, perhaps, for flies. But a loss for all who delight in the inventiveness of evolution.

Questions 1–5

Complete the notes below.

Choose ***ONE WORD ONLY*** *from the passage for each answer.*

Write your answers in boxes 1–5 on your answer sheet.

Carnivorous Plants

Darwin's experiments:

<u>Drosera</u>

- He put insects and small amounts of meat onto leaves and observed what happened.
- He was amazed that one human hair triggered a response.
- He understood why the plant did not respond to **1** ______.

<u>Venus flytrap</u>

- He demonstrated how leaves close and then, for a short period, act like a **2** ______.
- He noted the structure of the leaves ensures small insects are released.

Biology today:

<u>Venus flytrap</u>

- If insects come into contact with leaf hairs, their movement produces an electric charge.
- The charge enters fluid-filled tunnels, causing **3** ______ in cell membranes to open.
- Water moves between cells and then the leaf changes from convex to concave, trapping the insect inside.

<u>Bladderwort</u>

- Hairs bend when insects swim past, resulting in the opening of a flap.
- Water is sucked in.
- When water is pumped out of bladder cells, a **4** ______ builds up inside.

<u>Pitcher plants</u>

- The plants have tube-shaped leaves that insects fall into.
- Some plants are big enough to capture and eat **5** ______.

Questions 6–13

Do the following statements agree with the information given in Reading Passage 1?

In boxes 6–13 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*

6 Pitcher plants increase in size after they have digested a lot of insects.

7 Carnivorous plants produce light-harvesting enzymes with the nutrients they extract from animals.

8 Pitcher plants and Venus flytraps are more efficient at photosynthesis than plants with ordinary leaves.

9 Venus flytraps are better adapted to the soil of swamps and bogs than other carnivorous plants.

10 Carnivorous plants frequently find it difficult to photosynthesise in bogs due to a lack of sunlight.

11 Scientists have campaigned to reduce the amount of nitrogen that is released into the soil by agricultural practices.

12 A lot of exotic carnivorous plants are sold illegally.

13 Preventing wildfires is beneficial to the Venus flytrap.

填空题（Questions 1–5）

要求：ONE WORD ONLY

题号	答案	题干翻译	定位句（英）+ 段落	定位句（中）	详细解释
1	**raindrops**	他明白为什么这植物不会对**1 ____**作出反应。	“Yet sundews, he observed, **ignored raindrops**. To react to such a false alarm… would be a great evil to the plant.”（**第2段**）	“然而他观察到茅膏菜无视雨滴。对这种虚惊作出反应，对植物显然是弊大于利。”	题干“did not respond to”与原文“ignored”同义；能触发的是“一根人类头发”，而雨滴是“false alarm”，因此空格填 **raindrops**。
2	**stomach**	他证明叶片闭合后在短时间内会像一个**2 ____**那样工作。	“when one of its leaves **snapped shut, it formed itself into a temporary ‘stomach’**, secreting enzymes…”（**第3段**）	“当叶片**合上时，它会暂时形成一个‘胃’**，分泌酶来溶解猎物。”	题干“for a short period”=原文“temporary”；“act like”=“formed itself into”。唯一可填名词为 **stomach**。
3	**pores**	电荷进入充满液体的通道，使细胞壁中的**3 ____**打开。	“the electric charge travels down fluid-filled tunnels in a leaf, **which opens up pores in cell membranes**.”（**第6段**）	“电荷沿充液通道传导，**从而打开细胞膜上的孔**。”	原文是“pores in cell membranes”。若题干写成“cell walls”为出题改写，不影响空格词义；能打开的是“pores（孔隙）”，故填 **pores**。
4	**vacuum**	当从囊细胞把水泵出时，内部会形成 4 ____。	“The cells in the bladder then begin to pump water out again, **creating a new vacuum**.”（**第7段**）	“囊内细胞再次把水泵出，**形成新的真空**。”	“builds up inside”≈“creating…”，语义一致；名词为 **vacuum**。
5	**frogs**	一些植株足够大，可以捕获并吞食 5 ____。	“Some of the largest have pitchers up to 30 cm deep and can consume whole **frogs**…”（**第7段**）	“一些最大的可达30厘米深，能吞食整只**青蛙**。”	可数名词，填复数 **frogs**（雅思大小写/单复数均接受同义正确；此处语境为泛指多只）。

判断题（Questions 6–13）

题号	答案	题干翻译	定位句（英）+ 段落	定位句（中）	详细解释
6	**TRUE**	捕蝇草（应为“猪笼草”=pitcher plants）在消化大量昆虫后体型会增大。	“when scientists **feed pitcher plants extra bugs, the plants get bigger**.”（**第8段**）	“当科学家**给猪笼草喂更多虫子时，植株会长得更大**。”	明确说“喂更多虫子 → 长大”，与题干一致，判 **TRUE**。
7	**TRUE**	食虫植物用从动物身上提取的营养来制造**捕光酶**。	“Carnivorous plants… take **nitrogen and phosphorus** from the flesh **in order to build light-harvesting enzymes**.”（**第8段**）	“食虫植物从肉中获取**氮和磷，用于构建捕光酶**。”	与题干完全一致，判 **TRUE**。
8	**FALSE**	猪笼草和捕蝇草的光合作用比普通叶片植物更高效。	“A pitcher or a flytrap is **not very good at photosynthesis** because… they **do not have flat solar panels** that can absorb lots of sunlight.”（**第9段**）	“猪笼草或捕蝇草**不太擅长光合作用**，因为它们**没有扁平的‘太阳能板’**去吸收大量阳光。”	题干说“更高效”，原文说“not very good”=效率更低，故 **FALSE**。
9	**NOT GIVEN**	捕蝇草比其他食虫植物更适应沼泽/泥炭地的土壤。	（—）	（—）	文中只说“许多食虫植物生长在沼泽/沼地的贫瘠土壤中”，未对**捕蝇草 vs 其他食虫植物**作比较，信息缺失，判 **NG**。
10	**FALSE**	食虫植物在泥炭地常因缺乏阳光而难以进行光合作用。	“bogs are **often flooded with sunshine**, so even an inefficient carnivorous plant can carry out **enough photosynthesis** to survive.”（**第9段**）	“沼地**常常阳光充足**，因此即便效率不高的食虫植物也能完成**足够的光合作用**。”	与题干表述相反（并非缺阳光），故 **FALSE**。
11	**NOT GIVEN**	科学家曾发起行动以减少农业向土壤释放的氮。	“Chemical fertilizers… are **adding extra nitrogen** to many bogs in North America.”（**第10段**）	“化肥…正在向北美许多沼地**增加额外的氮**。”	文中只描述现象与后果，未提“科学家发起运动/倡议去减少”，信息缺失，判 **NG**。
12	**TRUE**	大量外来食虫植物被**非法售卖**。	“The **black market trade** in exotic carnivorous plants **is strong**…”（**第10段**）	“外来食虫植物的**黑市交易很活跃**。”	“black market trade… is strong”=非法交易多，符合题干“a lot… are sold illegally”，判 **TRUE**。
13	**FALSE**	预防野火对捕蝇草是有益的。	“The **suppression of wildfires**… allows other plants to grow quickly and **outcompete the Venus flytraps**.”（**第10段**）	“**抑制野火**…让其他植物迅速生长并**胜过捕蝇草**。”	抑制野火 → 竞争者增多 → 对捕蝇草不利。题干说“有益”，与原文相反，判 **FALSE**。