tpo_45_passage_2

Pollen, a powdery substance, which is produced by flowering plants and contains male reproductive cells, is usually carried from plant to plant by insects or birds, but some plants rely on the wind to carry their pollen. Wind pollination is often seen as being primitive and wasteful in costly pollen and yet it is surprisingly common, especially in higher latitudes. Wind is very good at moving pollen a long way; pollen can be blown for hundreds of kilometers, and only birds can get pollen anywhere near as far. The drawback is that wind is obviously unspecific as to where it takes the pollen. It is like trying to get a letter to a friend at the other end of the village by climbing onto the roof and throwing an armful of letters into the air and hoping that one will end up in the friend's garden. For the relatively few dominant tree species that make up temperate forests, where there are many individuals of the same species within pollen range, this is quite a safe gamble. If a number of people in the village were throwing letters off roofs, your friend would be bound to get one. By contrast, in the tropics, where each tree species has few, widely scattered individuals, the chance of wind blowing pollen to another individual is sufficiently slim that animals are a safer bet as transporters of pollen. Even tall trees in the tropics are usually not wind pollinated despite being in windy conditions. In a similar way, trees in temperate forests that are insect pollinated tend to grow as solitary, widely spread individuals. Since wind-pollinated flowers have no need to attract insects or other animals, they have dispensed with bright petals, nectar, and scent. These are at best a waste and at worst an impediment to the transfer of pollen in the air. The result is insignificant-looking flowers and catkins (dense cylindrical clusters of small, petalless flowers). Wind pollination does, of course, require a lot of pollen. Birch and hazel trees can produce 5.5 and 4 million grains per catkin, respectively. There are various adaptations to help as much of the pollen go as far as possible. Most deciduous wind-pollinated trees (which shed their leaves every fall) produce their pollen in the spring while the branches are bare of leaves to reduce the surrounding surfaces that "compete" with the stigmas (the part of the flower that receives the pollen) for pollen. Evergreen conifers, which do not shed their leaves, have less to gain from spring flowering, and, indeed, some flower in the autumn or winter. Pollen produced higher in the top branches is likely to go farther: it is windier (and gustier) and the pollen can be blown farther before hitting the ground. Moreover, dangling catkins like hazel hold the pollen in until the wind is strong enough to bend them, ensuring that pollen is only shed into the air when the wind is blowing hard. Weather is also important. Pollen is shed primarily when the air is dry to prevent too much sticking to wet surfaces or being knocked out of the air by rain. Despite these adaptations, much of the pollen fails to leave the top branches, and only between 0.5 percent and 40 percent gets more than 100 meters away from the parent. But once this far, significant quantities can go a kilometer or more. Indeed, pollen can travel many thousands of kilometers at high altitudes. Since all this pollen is floating around in the air, it is no wonder that wind-pollinated trees are a major source of allergies. Once the pollen has been snatched by the wind, the fate of the pollen is obviously up to the vagaries of the wind, but not everything is left to chance. Windborne pollen is dry, rounded, smooth, and generally smaller than that of insect-pollinated plants. But size is a two-edged sword. Small grains may be blown farther but they are also more prone to be whisked past the waiting stigma because smaller particles tend to stay trapped in the fast-moving air that flows around the stigma. But stigmas create turbulence, which slows the air

speed around them and may help pollen stick to them.

question 1

Which of the following can be inferred from paragraph 1 about pollen production?

A Pollen production requires a significant investment of energy and resources on the part of the plant.

B The capacity to produce pollen in large quantities is a recent development in the evolutionary history of plants.

C Plants in the tropics generally produce more pollen than those in temperate zones.

D The highest levels of pollen production are found in plants that depend on insects or birds to carry their pollen.

question 2

Paragraph 1 supports which of the following as the reason animals are a safer bet than wind as pollinators when the individual trees of a species are widely separated?

A Animals tend to carry pollen from a given flower further than the wind does.

B Animals serve as pollinators even where there is little wind to disperse the pollen.

C An animal that visits a flower is likely to deliberately visit other flowers of the same species and pollinate them.

D Birds and insects fly in all directions, not just the direction the wind is blowing at a given moment.

question 3

In paragraph 1, the author compares pollen moved by wind with letters thrown off roofs in order to

A explain why there are relatively few species of trees that depend on wind pollination

B compare natural, biological processes with human social practices

C make a point about the probability of wind-blown pollen reaching a tree of the same species

D argue against the common assumption that the tallest trees are the most likely to employ wind pollination

question 4

Paragraph 2 suggests that wind-pollinated plants do not have bright petals, nectar, and scent for which TWO of the following reasons? To receive credit, you must select TWO answers.

A They interfere with pollination by wind.

B They are easily damaged by wind.

C They are unnecessary.

D They reduce the amount of pollen that can be produced.

question 5

According to paragraph 3, why do most deciduous wind-pollinated trees produce their pollen in the spring?

A To avoid competing with evergreen conifers, which flower in the fall or winter

B So that the leaves of the trees receiving the pollen will not prevent the pollen from reaching the trees' stigmas

C Because they do not have enough energy to produce new leaves and pollen at the same time

D In order to take advantage of the windiest time of year

question 6

According to paragraph 4, which of the following is NOT an adaptation that helps ensure that pollen travels as far as possible?

A Pollen-producing flowers and catkins are located at or near the top of the tree.

B Trees grow at least 100 meters away from each other.

C Dangling catkins release pollen only when the wind is blowing hard.

D Pollen is not released during rain storms or when the air is damp.

question 7

The word “significant” in the passage is closest in meaning to

A sufficient

B considerable

C increasing

D small

question 8

Which of the sentences below best expresses the essential information in the highlighted sentence in the passage? Incorrect choices change the meaning in important ways or leave out essential information.

A Because smaller particles tend to stay trapped in the fast-moving air, they are blown much farther than other grains.

B Smaller particles are trapped by the stigma when fast-moving air flows past it.

C Small particles that are whisked past the waiting stigma gain speed and are often trapped in the fast-moving air.

D While smallness helps pollen travel farther, it also makes it more likely to be blown past the stigma.

question 9

Look at the four squares [ ] that indicate where the following sentence could be added to the passage. Where would the sentence best fit? Click on a square [ ] to add the sentence to the passage.

Pollen, a powdery substance, which is produced by flowering plants and contains male reproductive cells, is usually carried from plant to plant by insects or birds, but some plants rely on the wind to carry their pollen. Wind pollination is often seen as being primitive and wasteful in costly pollen and yet it is surprisingly common, especially in higher latitudes. Wind is very good at moving pollen a long way; pollen can be blown for hundreds of kilometers, and only birds can get pollen anywhere near as far. The drawback is that wind is obviously unspecific as to where it takes the pollen. It is like trying to get a letter to a friend at the other end of the village by climbing onto the roof and throwing an armful of letters into the air and hoping that one will end up in the friend's garden. For the relatively few dominant tree species that make up temperate forests, where there are many individuals of the same species within pollen range, this is quite a safe gamble. If a number of people in the village were throwing letters off roofs, your friend would be bound to get one. By contrast, in the tropics, where each tree species has few, widely scattered individuals, the chance of wind blowing pollen to another individual is sufficiently slim that animals are a safer bet as transporters of pollen. Even tall trees in the tropics are usually not wind pollinated despite being in windy conditions. In a similar way, trees in temperate forests that are insect pollinated tend to grow as solitary, widely spread individuals. Since wind-pollinated flowers have no need to attract insects or other animals, they have dispensed with bright petals, nectar, and scent. These are at best a waste and at worst an impediment to the transfer of pollen in the air. The result is insignificant-looking flowers and catkins (dense cylindrical clusters of small, petalless flowers). Wind pollination does, of course, require a lot of pollen. [] Birch and hazel trees can produce 5.5 and 4 million grains per catkin, respectively. [] There are various adaptations to help as much of the pollen go as far as possible. [] Most deciduous wind-pollinated trees (which shed their leaves every fall) produce their pollen in the spring while the branches are bare of leaves to reduce the surrounding surfaces that "compete" with the stigmas (the part of the flower that receives the pollen) for pollen. [] Evergreen conifers, which do not shed their leaves, have less to gain from spring flowering, and, indeed, some flower in the autumn or winter. Pollen produced higher in the top branches is likely to go farther: it is windier (and gustier) and the pollen can be blown farther before hitting the ground. Moreover, dangling catkins like hazel hold the pollen in until the wind is strong enough to bend them, ensuring that pollen is only shed into the air when the wind is blowing hard. Weather is also important. Pollen is shed primarily when the air is dry to prevent too much sticking to wet surfaces or being knocked out of the air by rain. Despite these adaptations, much of the pollen fails to leave the top branches, and only between 0.5 percent and 40 percent gets more than 100 meters away from the parent. But once this far, significant quantities can go a kilometer or more. Indeed, pollen can travel many thousands of kilometers at high altitudes. Since all this pollen is floating around in the air, it is no wonder that wind-pollinated trees are a major source of allergies. Once the pollen has been snatched by the wind, the fate of the pollen is obviously up to the vagaries of the wind, but not everything is left to chance. Windborne pollen is dry, rounded, smooth, and generally smaller than that of insect-pollinated plants. But size is a two-edged sword. Small grains may be blown farther but they are also more prone to be whisked past the waiting stigma because smaller particles tend to stay trapped in the fast-moving air that flows around the stigma. But stigmas create turbulence, which slows the air speed around them and may help pollen stick to them.

question 10

Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some sentences do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage. This question is worth 2 points.

A. Because there are few trees in temperate forests, it is safer to transport pollen by insects or birds.

B. Most wind-pollinated trees are deciduous because evergreen needles compete with the stigma for pollen, making wind pollination uncertain.

C. Wind pollination is a safe reproductive strategy for trees in temperate forests where there are only a few dominant species and, therefore, many individuals of the same species.

D. Wind-pollinated plants usually have small petalless flowers which often grow in catkins that produce a very fine-grained pollen.

E. Wind pollination requires production of a large amount of pollen, which must be released at the right time and under the right conditions to extend its range.

F. Wind-pollinated trees must grow in regions that are only moderately windy because strong winds will blow the tiny pollen grains past the stigma.