tpo_11_passage_2

To South Americans, robins are birds that fly north every spring. To North Americans, the robins simply vacation in the south each winter. Furthermore, they fly to very specific places in South America and will often come back to the same trees in North American yards the following spring. The question is not why they would leave the cold of winter so much as how they find their way around. The question perplexed people for years, until, in the 1950s, a German scientist named Gustave Kramer provided some answers and, in the process, raised new questions. Kramer initiated important new kinds of research regarding how animals orient and navigate. Orientation is simply facing in the right direction; navigation involves finding one's way from point A to point B. Early in his research, Kramer found that caged migratory birds became very restless at about the time they would normally have begun migration in the wild. Furthermore, he noticed that as they fluttered around in the cage, they often launched themselves in the direction of their normal migratory route. He then set up experiments with caged starlings and found that their orientation was, in fact, in the proper migratory direction except when the sky was overcast, at which times there was no clear direction to their restless movements. Kramer surmised, therefore, that they were orienting according to the position of the Sun. To test this idea, he blocked their view of the Sun and used mirrors to change its apparent position. He found that under these circumstances, the birds oriented with respect to the new "Sun." They seemed to be using the Sun as a compass to determine direction. At the time, this idea seemed preposterous. How could a bird navigate by the Sun when some of us lose our way with road maps? Obviously, more testing was in order. So, in another set of experiments, Kramer put identical food boxes around the cage, with food in only one of the boxes. The boxes were stationary, and the one containing food was always at the same point of the compass. However, its position with respect to the surroundings could be changed by revolving either the inner cage containing the birds or the outer walls, which served as the background. As long as the birds could see the Sun, no matter how their surroundings were altered, they went directly to the correct food box. Whether the box appeared in front of the right wall or the left wall, they showed no signs of confusion. On overcast days, however, the birds were disoriented and had trouble locating their food box. In experimenting with artificial suns, Kramer made another interesting discovery. If the artificial Sun remained stationary, the birds would shift their direction with respect to it at a rate of about 15 degrees per hour, the Sun's rate of movement across the sky. Apparently, the birds were assuming that the "Sun" they saw was moving at that rate. When the real Sun was visible, however, the birds maintained a constant direction as it moved across the sky. In other words, they were able to compensate for the Sun's movement. This meant that some sort of biological clock was operating-and a very precise clock at that. What about birds that migrate at night? Perhaps they navigate by the night sky. To test the idea, caged night-migrating birds were placed on the floor of a planetarium during their migratory period. A planetarium is essentially a theater with a domelike ceiling onto which a night sky can be projected for any night of the year. When the planetarium sky matched the sky outside, the birds fluttered in the direction of their normal migration. But when the dome was rotated, the birds changed their direction to match the artificial sky. The results clearly indicated that the birds were orienting according to the stars. There is accumulating evidence indicating that birds navigate by using a wide variety of environmental cues. Other areas under investigation include magnetism, landmarks, coastlines, sonar, and even smells. The studies are complicated by the fact that the data are sometimes contradictory and the mechanisms apparently change from time to time. Furthermore, one sensory ability may back up another.

question 1

Which of the following can be inferred about bird migration from paragraph 1?

A Birds will take the most direct migratory route to their new habitat.

B The purpose of migration is to join with larger groups of birds.

C Bird migration generally involves moving back and forth between north and south.

D The destination of birds' migration can change from year to year.

question 2

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 Experiments revealed that caged starlings displayed a lack of directional sense and restless movements.

B Experiments revealed that caged starlings were unable to orient themselves in the direction of their normal migratory route.

C Experiments revealed that the restless movement of caged starlings had no clear direction.

D Experiments revealed that caged starlings' orientation was accurate unless the weather was overcast.

question 3

According to paragraph 3, why did Kramer use mirrors to change the apparent position of the Sun?

A To test the effect of light on the birds' restlessness

B To test whether birds were using the Sun to navigate

C To simulate the shifting of light the birds would encounter along their regular migratory route

D To cause the birds to migrate at a different time than they would in the wild

question 4

According to paragraph 3, when do caged starlings become restless?

A When the weather is overcast

B When they are unable to identify their normal migratory route

C When their normal time for migration arrives

D When mirrors are used to change the apparent position of the Sun

question 5

Which of the following can be inferred from paragraph 4 about Kramer s reason for filling one food box and leaving the rest empty?

A He believed the birds would eat food from only one box.

B He wanted to see whether the Sun alone controlled the birds' ability to navigate toward the box with food.

C He thought that if all the boxes contained food, this would distract the birds from following their migratory route.

D He needed to test whether the birds preferred having the food at any particular point of the compass.

question 6

According to paragraph 5, how did the birds fly when the real Sun was visible?

A They kept the direction of their flight constant.

B They changed the direction of their flight at a rate of 15 degrees per hour.

C They kept flying toward the Sun.

D They flew in the same direction as the birds that were seeing the artificial Sun.

question 7

The experiment described in paragraph 5 caused Kramer to conclude that birds possess a biological clock because

A when birds navigate they are able to compensate for the changing position of the Sun in the sky

B birds innate bearings keep them oriented in a direction that is within 15 degrees of the Suns direction

C birds' migration is triggered by natural environmental cues, such as the position of the Sun

D birds shift their direction at a rate of 15 degrees per hour whether the Sun is visible or not

question 8

According to paragraph 6, how did the birds navigate in the planetarium's nighttime environment?

A By waiting for the dome to stop rotating

B By their position on the planetarium floor

C By orienting themselves to the stars in the artificial night sky

D By navigating randomly until they found the correct orientation

question 9

Which of the following best describes the author's presentation of information in the passage?

A A number of experiments are described to support the idea that birds use the Sun and the night sky to navigate.

B The author uses logic to show that the biological clock in birds is inaccurate.

C A structured argument about the importance of internal versus external cues for navigation is presented.

D The opposing points of view about bird migration are clarified through the study of contrasting experiments.

question 10

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

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