Reading 23

Bird Migration

The phenomenon of seasonal bird migration has been known about for thousands of years, but it is still not fully understood by scientists. Not all birds migrate, but generally speaking the more northerly the breeding ground, the more likely is it that a species will migrate south for the winter. The main reason for this annual shifting of residence is that during the northern winters food becomes scarce and the cold temperatures make survival difficult. Some species are well adapted to these harsh conditions, but for **those** that aren't, moving south to warmer conditions is advantageous.

Changes in the weather can trigger the start of the journey south, although birds in the Northern Hemisphere seem to know when it is time to migrate south before the winter. In some species at least, the changes in the length of the day cause glands in the birds' bodies to secrete hormones that produce other changes, which ready the birds for the long flight south. At this time fat starts to **accumulate** under the skin, and this provides a store of energy for the long flight when they will be expending more calories flying than they can obtain during their brief rest stops.

In fact, bird-migration patterns are more complex than the simple pattern implied above. Birds that breed in the Southern Hemisphere migrate north to wintering grounds. Other birds travel on an approximately east-west path since milder climates can often be found in coastal areas of continental regions. Some birds find conditions more suitable at lower altitudes in a mountainous region and so migrate to lower levels in winter.

Perhaps the most mysterious and as yet not totally understood aspect of bird migration is how birds can navigate such long distances and arrive so **precisely** at their destination. Various possibilities exist. A The most obvious explanation is that they learn the topographic* features of their route. B However, it is not feasible that this method could be used for crossing larger stretches of water or very long trips across whole continents. C Another possible explanation is that some birds may use magnetic fields. D Scientists have actually detected tiny crystals of magnetite in the olfactory* tract of some species, and homing pigeons have been shown to follow magnetic field lines of the Earth.

A further possibility is that birds can detect the polarization patterns in sunlight. Some light waves from the sun are absorbed in the atmosphere, and some pass through. The resulting pattern of light waves forms a large bowtie-shaped image in the sky. The image has fuzzy ends and is sometimes known as Haidinger's brush after the discoverer of the effect. The image is oriented in a north and south direction and is visible at sunset. Although birds may not see this shape, they can discern gradations of polarization, which give them a kind of compass for determining directions.

Scientists believe that some birds navigate by use of star positions; this has been established with at least one species. In a series of studies, caged birds were **subjected** to the projection of the nighttime Northern Hemisphere inside a planetarium. All stars rotate around Polaris, the pole star, and this movement seemed to give the birds the information they needed to orientate themselves in the correct direction. However, some recent research contradicts this. Perhaps it is not the lack of movement of the pole star but rather the constellation patterns that guide them. It has also been found that when fewer stars were visible on the planetarium ceiling, the birds' sense of direction became poorer. And **this**, too, implies that the general star pattern does have some bearing on orientation.

The current state of research suggests that all of the above-mentioned methods probably nave an influence on bird migration. Different species use one, some, or even all methods at different times and in various situations.

*__topographic__: relating to the natural features of land
*__olfactory__: connected with the sense of smell

Questions

13. In paragraph 1, it is understood that some birds don't migrate south in the winter because they
A already live in warmer conditions
B live in areas that have an abundant food supply
C have difficulty surviving the frigid temperatures
D are suited to the difficult conditions

14. The word "those' in the passage refers to
A northern winters
B cold temperatures
C harsh conditions
D some bird species

15. According to paragraph 2, what are the results of changes in the weather?
A The change in the length of the day
B The secretion of hormones by the birds
C The expenditure of calories
D The onset of migration

16. The word “accumulate” in the passage is closest in meaning to
A build up
B fill in
C break up
D cut back

17. All of the bird migration patterns are mentioned in the passage EXCEPT
A the migration north from the Southern Hemisphere
B the migration east or west toward milder climates
C the migration from mountainous regions to lower altitudes
D the migration from east to west towards hotter climates.

18. The word precisely' in the passage is closest in meaning to
A finally
B exactly
C entirely
D decisively

19. It can be inferred that polarization patterns
A absorb sunlight
B are tied in the center
C are invisible at night
D cause a magnetic force

20. Why does the author mention Haidinger’s brush?
A To understand the phenomenon
B To describe the pattern
C To explain what birds see
D To define the fuzzy ends

21. The word “subjected:" in the passage is closest in meaning to
A exposed
B subjugated
C constrained
D invited

22. According to paragraph 6, how do some birds navigate during the night?
A By using a projection of the star positions
B By circling around the pole star
C By orientating themselves using the constellations
D By getting their bearings from a few visible stars

23. 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 Birds needing to orientate themselves in the right direction seemed to use the information they get from the stars that rotate around Polaris.
B The pole star seemed to be used by birds to get the information they needed because they were able to orientate themselves using the star's rotation in the correct direction.
C Birds needing to correct the Polaris direction in which to orientate themselves seemed to use the fact that all stars rotate.
D The stars rotating in the correct direction around the pole star is what seemed to give the birds the information they needed for orientating themselves to Polaris.

24. The word 'this' in the passage refers to
A The number of stars that were visible
B The relative loss of the birds' sense of direction
C The constellation patterns that guide birds
D The pole star's stationary position

25. Look at the four squares that indicate where the following sentence could be added to the passage.
Over short distances the birds could recognize particular landscapes such as river valleys and shapes of hills.
Where would the sentence best fit?
Choose the letter of the square that shows where the sentence should be added.

26. 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. Write the letters of the answer choices in the spaces where they belong.

Scientists have proposed several methods that birds use for orientating themselves during their seasonal migrations.

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Answer Choices

A Birds not only migrate north or south depending on which hemisphere they live in, but they also migrate along coastal regions or in and out of mountainous areas.

B Birds' ability to detect gradations of polarization patterns in sunlight could give them a way for determining directions.

C Changes in both the weather and the length of day can cause the birds' bodies to make physical changes to prepare them for the long flights.

D The principal reason for birds to migrate is that most bird species are not adapted to the harsh winter conditions and the scarcity of food during that season.

E The star patterns and the way the stars rotate around the fixed position of the pole star could give birds the direction in which to navigate.

F Birds may use their knowledge of the features of the landscape, although this seems unlikely given the distances that birds migrate.

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13 D
The passage mentions that some species are well-adapted to harsh living conditions. It can be understood that such birds don't migrate south.
14 D
The word "those" refers to the species of birds that find moving south in the winter advantageous.
15 D
According to the passage, "changes in the weather can trigger the start of the journey south."
16 A
When fat "accumulates" under the skin, it "builds up."
17 D
The passage does not mention birds migrating east-west toward a hotter climate.
18 B
"Precisely" refers to an action that is performed "exactly" without error.
19 C
Since the polarization patterns are visible at sunset and the passage mentions patterns in sunlight, we can infer that they are not visible at night.
20 B
The bowtie shape of the pattern has "fuzzy" ends which are reminiscent of a brush.
21 A
The term "subjected" here means that the birds were exposed to the projection on the inside of the planetarium.
22 C
According to paragraph 6, some research using projections on the planetarium ceiling indicates the birds are guided by the constellations.
23 A
The highlighted sentence means the same as "Birds needing to orientate seemed to use the information... from the stars that rotate around Polaris."
24 B
The word "this" refers to the fact that when fewer stars are visible on the planetarium ceiling, the birds' sense of direction worsened.
25 B
The particular landscapes such as river valleys and shapes of hills are examples of the topographic features mentioned in the previous sentence.
26 B E F
The main ideas from the passage are all theories that scientists have studied in their attempt to understand the methods birds use to migrate. These theories are that birds may determine direction through detection of the gradations of polarization patterns in sunlight, through the rotation of stars around a fixed position, and through knowledge of landscape features.