Questions 21-30 are based on the following passage.

This passage is adapted from Thor Hanson, *Feathers*. ©2011 by Thor Hanson. Scientists have long debated how the ancestors of birds evolved the ability to fly. The ground-up theory assumes they were fleet-footed ground dwellers that captured prey by leaping and flapping their upper limbs. The tree-down theory assumes they were tree climbers that leapt and glided among branches.

At field sites around the world, Ken Dial saw a pattern in how young pheasants, quail, tinamous, and other ground birds ran along behind their parents. "They jumped up like popcorn," he said, describing how they would flap their half-formed wings and take short hops into the air. So when a group of graduate students challenged him to come up with new data on the age-old ground-up-tree-down debate, he designed a project to see what clues might lie in how baby game birds learned to fly.

Ken settled on the Chukar Partridge as a model species, but he might not have made his discovery without a key piece of advice from the local rancher in Montana who was supplying him with birds. When the cowboy stopped by to see how things were going, Ken showed him his nice, tidy laboratory setup and explained how the birds' first hops and flights would be measured. The rancher was incredulous. "He took one look and said, in pretty colorful language, 'What are those birds doing on the ground? They hate to be on the ground! Give them something to climb on!' " At first it seemed unnatural—ground birds don't like the ground? But as he thought about it Ken realized that all the species he'd watched in the wild preferred to rest on ledges, low branches, or other elevated perches where they were safe from predators. They really only used the ground for feeding and traveling. So he brought in some hay bales for the Chukars to perch on and then left his son in charge of feeding and data collection while he went away on a short work trip.

Barely a teenager at the time, young Terry Dial was visibly upset when his father got back. "I asked him how it went," Ken recalled, "and he said, 'Terrible! The birds are cheating!' " Instead of flying up to their perches, the baby Chukars were using their legs. Time and again Terry had watched them run right up the side of a hay bale, flapping all the while. Ken dashed out to see for himself, and that was the "aha" moment. "The birds were using their wings and legs cooperatively," he told me, and that single observation opened up a world of possibilities.

Working together with Terry (who has since gone on to study animal locomotion), Ken came up with a series of ingenious experiments, filming the birds as they raced up textured ramps tilted at increasing angles. As the incline increased, the partridges began to flap, but they angled their wings differently from birds in flight. They aimed their flapping down and backward, using the force not for lift but to keep their feet firmly pressed against the ramp. "It's like the spoiler on the back of a race car," he explained, which is a very apt analogy. In Formula One racing, spoilers are the big aerodynamic fins that push the cars downward as they speed along, increasing traction and handling. The birds were doing the very same thing with their wings to help them scramble up otherwise impossible slopes.

Ken called the technique WAIR, for wing-assisted incline running, and went on to document it in a wide range of species. It not only allowed young birds to climb vertical surfaces within the first few weeks of life but also gave adults an energy-efficient alternative to flying. In the Chukar experiments, adults regularly used WAIR to ascend ramps steeper than 90 degrees, essentially running up the wall and onto the ceiling.

In an evolutionary context, WAIR takes on surprising explanatory powers. With one fell swoop, the Dials came up with a viable origin for the flapping flight stroke of birds (something gliding animals don't do and thus a shortcoming of the tree-down theory) and an aerodynamic function for half-formed wings (one of the main drawbacks to the ground-up hypothesis).

21

Which choice best reflects the overall sequence of events in the passage? ORDER

A) An experiment is proposed but proves unworkable; a less ambitious experiment is attempted, and it yields data that give rise to a new set of questions.

B) A new discovery leads to reconsideration of a theory; a classic study is adapted, and the results are summarized.

C) An anomaly is observed and simulated experimentally; the results are compared with previous findings, and a novel hypothesis is proposed.

D) An unexpected finding arises during the early phase of a study; the study is modified in response to this finding, and the results are interpreted and evaluated. 38-43, 46, 49-50

22

As used in line 7, "challenged" most nearly means

A) dared. 6-9

B) required.

C) disputed with.

D) competed with.

23

Which statement best captures Ken Dial's central assumption in setting up his research?

A) The acquisition of flight in young birds sheds light on the acquisition of flight in their evolutionary ancestors. 8-11

B) The tendency of certain young birds to jump erratically is a somewhat recent evolved behavior.

C) Young birds in a controlled research setting are less likely than birds in the wild to require perches when at rest.

D) Ground-dwelling and tree-climbing predecessors to birds evolved in parallel.

24

Which choice provides the best evidence for the answer to the previous question?

A) Lines 1-4 ("At field . . . parents")

B) Lines 6-11 ("So when . . . fly")

C) Lines 16-19 ("When . . . measured")

D) Lines 23-24 ("At first . . . the ground")

25

In the second paragraph (lines 12-32), the incident involving the local rancher mainly serves to

A) reveal Ken Dial's motivation for undertaking his project.

B) underscore certain differences between laboratory and field research.

C) show how an unanticipated piece of information influenced Ken Dial's research. 16-23, 14

D) introduce a key contributor to the tree-down theory.

26

After Ken Dial had his "'aha' moment" (line 41), he

A) tried to train the birds to fly to their perches.

B) studied videos to determine why the birds no longer hopped.

C) observed how the birds dealt with gradually steeper inclines. 40-42 46-48

D) consulted with other researchers who had studied Chukar Partridges.

27

The passage identifies which of the following as a factor that facilitated the baby Chukars' traction on steep ramps?

A) The speed with which they climbed

B) The position of their flapping wings 49-53

C) The alternation of wing and foot movement

D) Their continual hopping motions

28

As used in line 61, "document" most nearly means

A) portray.

B) record. 61-63

C) publish.

D) process.

29

What can reasonably be inferred about gliding animals from the passage?

A) Their young tend to hop along beside their parents instead of flying beside them.

B) Their method of locomotion is similar to that of ground birds.

C) They use the ground for feeding more often than for perching.

D) They do not use a flapping stroke to aid in climbing slopes. 70-74

30

Which choice provides the best evidence for the answer to the previous question?

A) Lines 4-6 ("They jumped . . . air")

B) Lines 28-29 ("They really . . . traveling")

C) Lines 57-59 ("The birds . . . slopes")

D) Lines 72-74 ("something . . . theory")