Reading: Robot Quiz 3

Passage IV

NATURAL SCIENCE: This passage is adapted from *The Earth Dwellers: Adventures in the Land of Ants* by Erich Hoyt (©1996 by Erich Hoyt).

In the steamy first light of the tropical rain forest in Costa Rica, life is buzzing. The forest echoes with the whooping calls of the oropendolas [tropical birds]. At lower volume but ever more persistent is the hissing of thousands of cicadas and other insects. In the distance howler monkeys are on dawn patrol.

No matter the racket, nocturnal animals are winding up their day and preparing to sleep, while those that need light to hunt are just awake and looking for breakfast. Still others—including some of the insects—have been working all night and will continue into the day.

From overhead a shaft of light beams down on a scene of frenetic activity. A worker ant—a foraging scout, female, as are all ant workers—stands on the leaf of a low-growing bush. Her hind legs are digging in, her head is down, hard at work. Her serrated mandibles, her jaws, are moving, sawing through a leaf. The air is pungent with leaf sap. As it drips from the leaf, she stops to lick a drop or two for refreshment. Two seconds later she's back at work.

As she saws, the sharp blade of her mandibles cuts through the leaf tissues, and her round head bobs up and down with the rhythm of a woodcutter. Slowly she begins to pivot on her hind legs to inscribe a curved line. She turns steadily, finally coming all around in a nearly perfect circle. She nudges the leaf panel to break the final perforations, and it falls to the ground. She jumps down, squats over the leaf piece, and marks it with a drop of liquid from the underside of her rear abdomen, her gaster. This marking will make the piece more attractive to the others in the colony. It also contributes enzymes that will eventually help break down the leaf. Then she grabs the leaf piece with her mandibles, hoisting it high so that it almost rests on her antennae like a floppy, oversized hat. She walks a few feet into the full sunlight of the forest clearing and stops. Her leafy hat is heavy.

In the speckled light of the clearing, the scout's entire body, seen in profile, glows reddish brown—except for the protruding black eyes. She has the distinctive spines of a leafcutter, or parasol, ant. They look like thorns rising from her back. She is covered in fine, tiny hairs from her head to her rear feet. The two antennae droop under the weight of her green load—the piece of leaf is three times her body mass. She struggles to press the green prize up high. And then another, much smaller leafcutter ant appears out of nowhere, climbs aboard the leaf piece, and clings to one end of it. She is less than a quarter the size of the scout, her nestmate. This smaller worker keeps alert for enemies. She, too, marks the leaf piece with a drop or two from her abdomen, contributing more enzymes to help break down the leaf.

Today the scout has what may well be a new leaf species—an untried plant for her colony. Her leaf-prize thrives on a few low-lying bushes at the edge of a clearing, some distance from the nest. It is an exotic plant—an introduced (that is, not native) species, perhaps a plant that escaped from a nearby farmer's field. As an exotic, it has fewer of the built-in defenses that many indigenous plants have evolved through living among insects for millions of years. Therefore, herbivorous insects, mammals, and other animals may be able to make easier use of it.

In a survey of forty-two plant species from the forests of Costa Rica, 75 percent contained terpenoids, steroids, waxes, and other defense compounds that repel leafcutters. Many tropical forest leaves are tough and have sharp spines that discourage monkeys and other animals from eating them. But the persistent leafcutters aren't much bothered. Their razor-sharp mandibles can slice through some of the fleshiest leaves and even twigs and stems. With regard to defense compounds, the leafcutters are selective about what they cut, but in species-rich tropical forests they have a lot of choice. Surprisingly, the rarity or commonness of the plant species has no real bearing on its appeal to the prospective leafcutter scout. Neither is proximity a crucial factor; leafcutters will walk a few hundred feet to a favored plant species. Researchers estimate that the tribe of gardening ants, which leafcutters belong to, cuts 12 to 17 percent of the leaves and flowers produced in the forests they inhabit. On one island in Panama, leafcutters annually cut almost 250 pounds of foliage per acre. To put it in terms of a colony, every day a single mature colony uses as much vegetation as a cow.

31. Which of the following characterizations is accurate about leafcutter ants as depicted in the passage?

- **A.** Hardworking and relatively particular about which plants they cut
- **B.** Determined and most active during the early rainy season
- **C.** Fragile and covered with fine, tiny thorns from head to rear
- **D.** Most active during the night and able to use their mandibles rhythmically

32. It can most reasonably be inferred from the passage that the leafcutter ant's primary reason for cutting leaves is to provide:

- **F.** camouflage from predators such as hunting ants.
- **G.** a platform for another, smaller leafcutter ant to ride on.
- **H.** protection for itself from drowning in rain or burning in the sun.
- **J.** nourishment for itself and the rest of the leafcutter ant colony.

33. According to the passage, the primary purposes of the leafcutter ant's gaster liquid are to:

A. make leaf cutouts appealing to other leafcutter ants in the colony and to begin to break down the leaf chemically.
B. make leaf cutouts sticky so they are easier to carry and to provide nourishment to the leafcutter ants.
C. repel predators and other animals and to mark the leafcutter ant's trail through the forest so other ants can follow.
D. enable the leafcutter ant to cut through leaf tissues and to break the final perforations of the leaf panel so the panel can fall to the ground.

34. In line 7, the word *racket* most likely refers to all of the following EXCEPT the:

F. hissing of thousands of cicadas and other insects.
G. sawing through leaf tissue by the leafcutter ant.
H. whooping calls of the oropendolas.
J. howler monkeys on dawn patrol in the distance.

35. Which of the following questions can be answered by information provided in the passage?

A. Why do so many more species of animals live in the rain forest than in other parts of the world?
B. How do leafcutter ants use their hind legs in the leafcutting process?
C. By the time the leafcutting process has been completed, how much leaf sap has the ant consumed?
D. How long does it take for the enzymes from the leafcutter ant's gaster to break down a leaf piece?

36. It can reasonably be inferred from the passage that leafcutter ants pay the most attention to which one of the following criteria when selecting plants whose leaves they will cut?

F. The plant must be free of sharp spines that could injure the leafcutter ant's mandibles.
G. The plant must be within a fifty-foot radius of the colony's nest.
H. The plant must be free of chemical defense compounds such as steroids.
J. The plant must be a member of one of the common species of tropical plants.

37. It can reasonably be inferred from the second paragraph (lines 7–11) that:

A. sleep habits of nocturnal animals are determined by the amount of noise in the tropical rain forest.
B. leafcutter ants and other insects are the prey of howler monkeys looking for breakfast.
C. little seems to disturb the various morning behaviors of animals in the rain forest.
D. most tropical rain forest animals need light to hunt.

38. According to the passage, leafcutter ant scouts are like all other worker ants in a leafcutter colony in which one of the following ways?

F. They make no noise.
G. They are female.
H. They cut any vegetation.
J. They are active during the night.

39. According to the passage, the leaf being sawed and then carried by the leafcutter ant has which one of the following characteristics?

A. It contains pungent sap.
B. It has a serrated stem.
C. It contains terpenoids.
D. It has fragile midribs.

40. Which of the following statements about leafcutter ants is supported by details in the passage?

F. A leafcutter ant produces only enough gaster liquid to mark one leaf piece in the leafcutting process.
G. A leafcutter ant scout is capable of carrying loads several times its body mass.
H. Leafcutter ants are less likely than other animals to accelerate the evolution of plant chemical defenses in the rain forest.
J. As light increases in the rain forest, the leafcutter ant scout's reddish brown glow intensifies.

END OF TEST 3

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