Passage IV

NATURAL SCIENCE: This passage is adapted from *The Giant Panda is a Closet Carnivore* by Ed Yong (©2020 by The Atlantic).

The giant panda, a consummate vegetarian, belongs to a group of mammals called Carnivora, so-called because almost all of them—dogs, cats, hyenas, weasels, mongooses, raccoons, and more—eat meat. But the giant panda's diet of bamboo, and little else, makes it a vegetarian.

At least, outwardly.

Yonggang Nie and Fuwen Wei of the Chinese Academy of Sciences have spent years tracking wild pandas, analyzing exactly what kinds of bamboo they eat, and measuring the chemicals within those mouthfuls. And they found that the nutrient profile of a panda's all-bamboo diet—very high in protein, and low in carbohydrates—is much closer to that of a typical carnivore than to that of other plant-eating mammals. "It was a surprise," Wei says. Nutritionally, "bamboo looks like a kind of meat."

In other words, "the giant panda does what human vegetarians do," says Silvia Pineda-Munoz of the Georgia Institute of Technology. "We have high protein requirements, so we wouldn't be able to survive if we just ate kale salad. Thus, we choose to eat tofu, beans, nuts, and other plant-based foods that compensate for the protein we aren't getting from animal products. In the end, vegetarians and nonvegetarians don't have such different diets when it comes to nutrients." And so it is with China's black-and-white bear.

This discovery explains some puzzling parts of panda biology. The panda's ancestors switched to a vegetarian diet more than 2 million years ago. In that time, the panda has evolved stronger jaws for chewing tough, fibrous mouthfuls, and one of its wristbones has become a false thumb, for gripping bamboo stems. But despite these superficial hardware changes, it still has a meat eater's digestive system.

Plant-eating mammals almost always have enlarged, elongated guts to slow the passage of food, and to give their inner bacteria more time to digest their meals. The panda, however, has the short, vanilla gut of a carnivore. Even its gut microbes are closer to a bear's than, say, a cow's or deer's. Nie and Wei's study makes sense of this paradoxical combination of traits. The giant panda has the plumbing of a half-committed herbivore because it has the *diet* of a closet carnivore.

The team used tracking collars to follow pandas in China's Foping National Nature Reserve, which harbors the highest density of these bears in the world. The pandas, it turned out, migrate over long distances to exploit the shoots and leaves of two bamboo species, which grow at different altitudes. Every year, the bears cycle from low-growing leaves, to low-growing shoots, to high-growing shoots, to high-growing leaves, and back again. The team analyzed these varied mouthfuls and determined that the pandas' decisions seem largely motivated by protein. They're always selecting the species and tissues that offer the most protein and the least fiber.

Their selective tastes mean that at least 50 percent of their energy comes from protein, while just 39 percent comes from carbohydrates, and 13 percent from fat. That's comparable to feral cats and wolves, which also get half their energy from protein. And it's starkly different from other plant-eating mammals, which typically get 20 percent of their energy from protein.

This suggests that the move from meat to plants might have been easier for ancestral pandas than commonly assumed. By simply choosing parts of plants that are richer in protein, they could switch to vegetarianism without needing to radically overhaul their bodies. "If you're going to switch to a specific plant, bamboo isn't too bad, as it does have respectable plant protein levels, as well as a swath of different vitamins," says Garret Suen of the University of Wisconsin at Madison.

These results should help to counter the tiresome myth that pandas are evolutionary dead ends: lazy, poorly adapted creatures that eat deficient diets, are inept at sex, and should be allowed to go extinct. Nonsense. Pandas have beautifully adapted to eat an

extremely plentiful food source—bamboo—and they go to great, careful lengths to get exactly the right balance of nutrients. Perhaps by felling large expanses of China's bamboo forests, humans have disrupted the panda's ability to find the specific protein-rich morsels that it needs. And perhaps captive pandas are so famously prone to digestive problems, and loath to breed, because they're not being fed the right kinds of bamboo.

Even in other bear species, appearances can be deceiving. Black and brown bears in the U.S. "have a diet that is about 80 percent vegetation," Pineda-Munoz says. "During the summer, they load [up] on animal protein for a few weeks, but in general they are herbivores. Diet is more complex than we think."

31. The passage suggests that the health and behavioral problems of captive pandas may be caused by:

    A. a shortage of bamboo during summer months.
    B. elongated guts that slow digestion
    C. a diet that is deficient in protein-rich bamboo.
    D. the destruction of China's bamboo forests.

32. As it is used in line 85, the word *loath* most nearly means:

    F. unwilling.
    G. unable.
    H. eager.
    J. disgusted.

33. It can reasonably be inferred from the passage that the phrase "evolutionary dead ends" (line 76) refers to species that have:

    A. become threatened with extinction because of human activity.
    B. become the subject of myths.
    C. evolved to eat a plant-based diet despite a carnivore's digestive system.
    D. developed characteristics that make them more likely to go extinct.

34. Pineda-Munoz' statement that "the giant panda does what human vegetarians do" (lines 18–19) most closely means that both:

    F. have diets similar to those of most plant-eating mammals.
    G. choose plant-based foods that are high in protein.
    H. have nutrient profiles that vary significantly from nonvegetarians
    J. Struggle to consume enough protein to meet nutritional needs.

35. As it is described in the seventh paragraph (lines 45–57), Nie and Wei's study of pandas in the Foping National Nature Reserve concluded that the animals:

    A. migrate long distances to find enough bamboo to meet their needs.
    B. seek out bamboo with the highest amount of protein.
    C. prefer low-growing bamboo shoots and leaves to high-growing ones.
    D. select bamboo species with the most fiber.

36. The passage indicates that ancestral pandas' switch from a meat-based to a plant-based diet was made easier because:

    F. their bodies had evolved to be more like herbivores.
    G. they still ate meat during the summer.
    H. they adapted to a diet that was lower in protein.
    J. bamboo shoots and leaves are high in protein.

37. As it is used in line 75, the word *tiresome* most nearly means:

    A. annoying.
    B. fatigued
    C. outdated
    D. incorrect

38. Based on the passage, which of following scenarios provides the best example of the phrase "appearances can be deceiving" as it is used in lines 88–89?

    F. An animal has the digestive system of an herbivore, but it mostly eats meat.
    G. Despite having a plant-based diet, an animal is classified as a carnivore.
    H. Two types of bears look similar but may belong to different species.
    J. A mammal gets only 20 percent of its energy from protein but is considered a carnivore.

39. The passage most strongly suggests that compared to that of other meat-eating mammals, a panda's digestive tract is:

    A. larger and longer to slow digestion.
    B. more like that of an herbivore.
    C. similar in length.
    D. poorly adapted to available food sources.

40. According to the passage, which of the following characteristics of pandas have evolved during the last 2 million years?

    F. stronger jaws for chewing plant fiber.
    G. a plant-eater's digestive system.
    H. greater need for a high-protein diet.
    J. teeth that are typical of herbivores.

Answer Key:

31. C
32. F
33. D
34. G
35. B
36. J
37. A
38. G
39. C
40. F