Name: _____ AM MID PM

Article of the Week for the Week of November 13, 2017
Due Friday, November 17, 2017

_____/20 points

1. Read the article and **diffuse** the text. Underline unfamiliar words, use context clues to help find the meaning, and write two possible synonyms for at least two unfamiliar words. (2 pts)
2. Read again. Circle at least 3 **transitions** used by the author to link ideas and paragraphs. (3 pts)
3. Skim the article. Look for **text features** that help your understanding. Put a box around two and write how they help your understanding of the article. (2 pts)
4. Read again. Write 3+ **thoughtful comments** (*connect, question, paraphrase*) in the margins. (3 pts)
5. Read the writing prompt at the end of the article. Read and underline or highlight information you will use to help you answer the prompt. (10 pts)

The best of biomimicry: 4 brilliant examples of nature-inspired design

Dallon Adams, adapted from *www.digitaltrends.com*, January 28, 2017

Sometimes the best solution to a problem is simple, and, similarly, the best answer can be an old one. While we humans may be getting our feet wet with creatively solving problems, the animal kingdom has millennia of evolutionary trial-and-error to learn from.

Biomimicry, as it's called, is a method for creating solutions to human challenges by emulating designs and ideas found in nature. It's used everywhere: buildings, vehicles, and even materials. Here are four of the most astounding technological applications inspired by nature.

Bullet trains inspired by Kingfisher birds

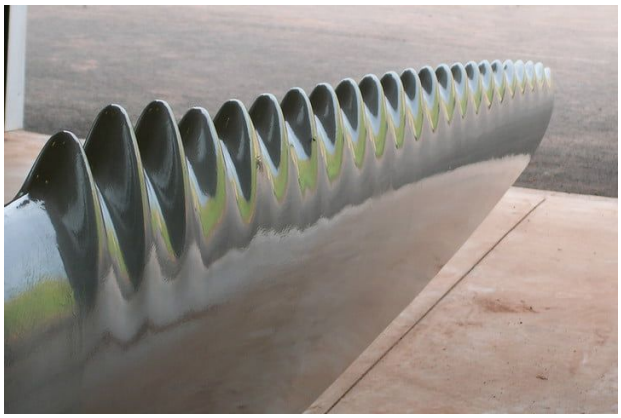
When Japanese engineers took on the daunting task of upgrading their high-speed bullet trains, their design hit one unfortunate snag. The problem wasn't getting the trains up to the desired speeds. The problem was the massive amount of noise created by the displacement of air ahead of the trains. As the trains entered tunnels, the trains would

often create a loud shock wave known as “tunnel boom.” The power of the shock waves even caused structural damage to several tunnels.

The design team determined the culprit to be the trains’ rather blunt front nose cap. To minimize the tunnel boom and increase overall aerodynamics they would need a more streamlined nose. The engineers eventually modeled the next model after the beak of the Kingfisher bird.

Kingfisher birds have specialized beaks allowing them to dive into water to hunt while making a minimal splash. Using this new nose, the next generation 500 series trains were 10 percent faster, consumed 15 percent less electricity, and, most importantly, no more “boom.”

Wind turbines modeled after Humpback whales

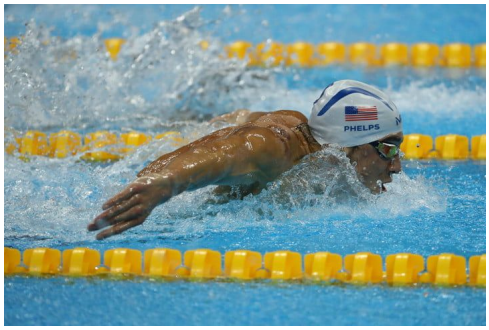


Many of our modern aerodynamic designs rely on basic principles. To obtain optimal lift and minimal drag, sleek edges and clean lines are key. However, throughout the animal kingdom, many species are capable of exceptional lift. The Humpback whale, for example, uses bumpy, tubercle fins for propulsion — which seems counterintuitive.

A Harvard-led research team determined that these nodules enable the whales to choose a steeper “angle of attack.” The angle of attack is the angle between the flow of water and the face of the flipper. With Humpback whales, this attack angle can be up to 40 percent steeper than a smooth flipper.

Tests conducted by the U.S. Naval Academy, using model flippers, determined these biomimetic fins reduced drag by nearly a third and improved lift by eight percent overall. Whale Power, a company based in Toronto, Canada has already capitalized on this latest tubercle tech. According to MIT, Whale Power’s biomimetic blades help generate the “same amount of power at 10 miles per hour that conventional turbines generate at 17 miles per hour.”

Antimicrobial film mimicking sharkskin



Sharks are one of the top predators of the seas. Their hunting skill has been fine-tuned over millions of years. While sharks are well known for their accurate sense of smell and regenerating teeth, new research may point to the species' skin as its top tool.

Sharkskin is covered with so-called "dermal denticles." Think of these as flexible layers of small teeth. When in motion, these dermal denticles actually create a low-pressure zone. This leading edge vortex "pulls" the shark forward and also helps reduce drag.

Speedo incorporated biomimetic sharkskin into a line of swimsuits for the 2008 Olympics. According to the Smithsonian, 98 percent of the medals at the 2008 Olympics were won by swimmers wearing this sharkskin swimwear. Since then the technology has been banned in Olympic competition.

Similarly, many aquatic species are known to host other marines species on their bodies. Sharkskin doesn't host any other species. The U.S. Navy has developed a material known as Sharklet based on this skin pattern to help prevent growth of marine organisms on ships. Based on this same idea, many hospitals are using a biomimetic sharkskin film to combat cross-contamination of germs, bacteria, and viruses.

Harvesting water like the Stenocara beetle

It's really no secret: access to water is crucial to any civilization and life on this planet in general. While some locations on the globe have more than enough water resources such as lakes and rivers, more arid climates must make do with limited precipitation. Technology derived from a beetle thriving in one of the harshest environments on Earth may very well help start the next generation of clean water harvesting.

The Stenocara beetle lives in the arid African Namib desert, but the dime-sized critter has an evolutionary hack to help it pull water out of thin air. A pattern of nodes along the beetle's back enable the creature to collect moisture from the morning fog. The droplets then slide off the bumps into small channels towards the beetle's mouth. Academics are currently using this research to develop biomimetic patterns capable of harvesting water from the air.

Writing Prompt: In the space below, write an expository paragraph explaining how biomimicry improves our world.

Your paragraph must:

- Be at least 5 sentences long
- Start with a clear **topic sentence** that answers the prompt
- Use information from the article for your **supporting details**
- Explain the connection between your supporting details and the prompt using **commentary**