Close descriptions

"Nothing compares with the giants found in Cueva de los Cristales, or Cave of Crystals… Fallen obelisks, pillars of light, the crystals are enormous, some several feet thick. On the floor and walls are clumps of smaller crystals, sharp as blades and flawlessly transparent. [Our guide] Badino proceeds slowly, careful not to damage the crystals, which are made of selenite, a form of the common mineral gypsum. Selenite is translucent and soft, easily scratched by boot heels, even fingernails… In their architecture crystals embody law and order, stacks of molecules assembled according to rigid rules… In the presence of such beauty and strangeness, people cast around for familiar metaphors. Staring at the crystals, [crystallographer Juan Manuel] García decided that the cave reminded him of a cathedral; he called it the Sistine Chapel of crystals. In both cathedrals and crystals there's a sense of permanence and tranquility that transcends the buzz of life. In both there is the suggestion of worlds beyond us." — Neil Shea, "Crystal Palace," *National Geographic*, November 2008. (162 words)

"To start with, a pear has an unusual shape. It's round and fat on the bottom, but tapered on top. A pear becomes tapered in a symmetrical way, its upper half sitting straight and centered atop its lower half. If you look at an apple with your mind's eye, you will notice that the girth of the apple is at its widest either in the middle of the fruit or in the top third. You must imagine an apple that is at its widest in the bottom third. But we must not push the comparison too far. The bottom of a pear is not like an apple's. Most apples sit on their buttocks, so to speak, on a circular ridge or on four or five points that keep them from falling over. Past the buttocks, a little ways up, there's what would be the anus of the fruit if the fruit were a beast. Well, a pear is not like that. A pear has no buttocks. Its bottom is round. There's something else about the bottom of a pear. Most pears do not have those vertical grooves that some apples have. Most pears have smooth, round, even bottoms. Now let us move north past our fruity equator. There comes this tapering I was telling you about. Imagine the tip of a banana. The end tip, the one you hold in your hand when you're eating one. Take the end tip of a common banana, then, and place it on top of an apple, taking into account the differences between apples and pears that I've just described. Now make the lines smoother, gentler. Let the banana flare out in a friendly way as it merges into the apple. Can you see it? One last detail. At the very top of this apple-banana composite, add a surprisingly tough stalk, a real tree trunk of a stalk. There, you have an approximation of a pear.

"In color, commonly, a pear is yellow with black spots. A pear isn't yellow in so bright, lusterless and opaque a way. It's a paler, translucent yellow, moving towards beige, but not creamy, more watery, approaching the visual texture of a watercolor wash. And the spots are sometimes brown.

"Now the skin. It's a peculiar skin, the pear's, hard to describe. We were speaking of apples and bananas. They have smooth, slippery skins. A pear does not have so smooth or slippery a skin. A pear has a rougher skin. An avocado's skin is as warty as a toad's. An avocado looks like a vegetable with leprosy. The pear is characterized by a thin roughness, delicate and interesting to the touch. If you could magnify it a hundred times, do you know what it would sound like, the sound of fingertips running over the skin of a dry pear? It would sound like the diamond of a record player entering a groove. That same dancing crackle, like the burning of the driest, lightest kindling. We're not talking here of the waxy, thuggish skin of an orange. The skin of a pear is soft and yielding when ripe.

“You must smell it first. A ripe pear breathes a fragrance that is watery and subtle, its power lying in the lightness of its impression upon the olfactory sense. Can you imagine the smell of nutmeg or cinnamon? The smell of a ripe pear has the same effect on the mind as these aromatic spices. The mind is arrested, spellbound, and a thousand and one memories and associations are thrown up as the mind burrows deep to understand the allure of this beguiling smell — which it never comes to understand, by the way.

“Slice a pear and you will find that its flesh is incandescent white. It glows with inner light. Those who carry a knife and a pear are never afraid of the dark.

“An apple resists being eaten. An apple is not eaten, it is conquered. The crunchiness of a pear is far more appealing. It is giving and fragile. To eat a pear is akin to . . . kissing.

“The taste of a good pear is such that when you eat one, when your teeth sink into the bliss of one, it becomes a wholly engrossing activity. You want to do nothing else but eat your pear. You would rather sit than stand. You would rather be alone than in company. You would rather have silence than music. All your senses but taste fall inactive. You see nothing, you hear nothing, you feel nothing — or only as it helps you to appreciate the divine taste of your pear.”
—Yann Martel, *Beatrice and Virgil,* 2010 (777 words)

“Trilobites may be the archetypal fossils, symbols of an archaic world long swept beneath the ruthless road grader of time. But we should all look so jaunty after half a billion years. At the Smithsonian’s National Museum of Natural History, Brian T. Huber, chairman of paleobiology, points to a flawless specimen of Walliserops, a five-inch trilobite that swam the Devonian seas around what is now Morocco some 150 million years before the first dinosaurs hatched. With its elongated, triple-tined head horn and a bristle brush of spines encircling its lower body, the trilobite could be a kitchen utensil for Salvador Dalí. Nearby is the even older Boedaspis ensifer, its festive nimbus of spiny streamers pointing every which way like the ribbons of a Chinese dancer. “A lot of people, when they see these fossils, don’t believe they’re real,” said Dr. Huber, who is 54, fit from years of fieldwork, and proud that the state fossil of his native Ohio is a trilobite. “They think they must be artists’ models.”

The fossils are real, and so, too, is scientists’ unshakable passion for trilobites (TRY-luh-bites), a diverse and illuminating group of marine animals, distantly related to the horseshoe crab, that once dominated their environment as much as dinosaurs and humans would later dominate theirs — and that still have a few surprises up their jointed sleeves.

Some researchers have proposed that many of the more gothic features identified in the trilobite fossil record — the oversized head horns, the curlicue shoulder spines, and maybe the eyestalks that look like a couple of periscopes plunked on either side of a trilobite's face — are the trilobitic equivalent of a peacock's tail, results of sexual selection rather than adaptations to the environment.

Researchers have identified some 20,000 trilobite species, which range in adult size from a quarter-inch to the dimensions of a kitchen tabletop.

Researchers were long at a loss to explain the origins of all the architectural partitioning. They believed that early trilobites lived flatly, like flounders, and only later would take advantage of their longitudinal seams to begin enrolling — curling up into a ball, armadillo-style, to protect their soft underparts. But last fall a team from the University of Cambridge and the Chinese Academy of Sciences reported the discovery of fully enrolled fossils dating to the trilobite's advent, in the Cambrian period roughly 510 million years ago, suggesting that the lobes were about enrollment from the start. Later still, with the rise of jawed fish and other fierce predators, trilobites evolved increasingly elaborate enrollment techniques, including tips and sockets that locked together and made the rounded trilobite almost impossible to pry apart.

Trilobite eyes were unlike those of virtually any other known animal, the lenses built not of protein but of calcite crystals, lending the animals a "stony stare," as Dr. Fortey put it.

In most trilobites, each compound orb held hundreds of tiny calcite lenses, arranged in a tightknit honeycomb pattern, like the eye of a fly. But fairly late in trilobite evolution one group developed a different sort of eye, composed of a smaller number of larger, separated calcite lenses. On the back of the lenses, the scientists were astonished to see traces of the sensory receptor cells that once linked the eyes to the brain."
— Natalie Angier, "When Trilobites Ruled the World, *New York Times*, March 2014 (543 words)

"Hidden in an unknown corner of Inner Mongolia is a toxic, nightmarish lake created by our thirst for smartphones, consumer gadgets and green tech. From where I'm standing, the city-sized Baogang Steel and Rare Earth complex dominates the horizon, its endless cooling towers and chimneys reaching up into grey, washed-out sky. Between it and me, stretching into the distance, lies an artificial lake filled with a black, barely-liquid, toxic sludge. Dozens of pipes line the shore, churning out a torrent of thick, black, chemical waste from the refineries that surround the lake. The smell of sulphur and the roar of the pipes invades my senses. It feels like hell on Earth.

Apparently created by damming a river and flooding what was once farmland, the lake is a “tailings pond”: a dumping ground for waste byproducts. We reached the shore, and looked across the lake. I’d seen some photos before I left for Inner Mongolia, but nothing prepared me for the sight. It’s a truly alien environment, dystopian and horrifying. The thought that it is man-made depressed and terrified me, as did the realisation that this was the byproduct not just of the consumer electronics in my pocket, but also green technologies like wind turbines and electric cars that we get so smugly excited about in the West.”
— Tim Maughan, “The dystopian lake filled by the world’s tech lust”, *BBC Online,* April 2015 (217 words)

“Tardigrades, at first glance, are intimidating. They have podgy faces with folds of flesh, a bit like a Doctor Who monster. They have eight legs, with ferocious claws resembling those of great bears. Their mouth is also a serious weapon, with dagger-like teeth that can spear prey. Fossils of tardigrades have been dated to the Cambrian period over 500 million years ago But there's no need to worry. Tardigrades are one of nature's smallest animals. They are never more than 1.5 mm long, and can only be seen with a microscope. They are commonly known as "water bears".

One of the key discoveries came in 1922, courtesy of a German scientist named H. Baumann. He found that when a tardigrade dries out it retracts its head and its eight legs. It then enters a deep state of suspended animation that closely resembles death. Shedding almost all the water in its body, the tardigrade curls up into a dry husk. Baumann called this a "Tönnchenform", but it is now commonly known as a "tun". Its metabolism slows to 0.01% of the normal rate. It can stay in this state for decades, only reanimating when it comes into contact with water.”
— Jasmin Fox-Skelly, “Tardigrades return from the dead,” *BBC* Online, March 2015 (199 words)

“Astronomers tinkering with ice and organics in the lab may have discovered why comets are encased in a hard, outer crust. Using an icebox-like instrument nicknamed Himalaya, the researchers show that fluffy ice on the surface of a comet would crystalize and harden as the comet heads toward the sun and warms up. As the water-ice crystals form, becoming denser and more ordered, other molecules containing carbon would be expelled to the comet's surface. The result is a crunchy comet crust sprinkled with organic dust.

‘A comet is like deep fried ice cream,’ said Murthy Gudipati of NASA's Jet Propulsion Laboratory in Pasadena, California, corresponding author of a recent study appearing in *The Journal of Physical Chemistry*. ‘The crust is made of crystalline ice, while the interior is colder and more porous. The organics are like a final layer of chocolate on top.’

Last November, Rosetta's Philae probe bounced to a landing on the surface of 67P/Churyumov-Gerasimenko, confirming that comets have a hard surface. The black, soot-like coats of comets, made up of organic molecules and dust, had also been seen before by the Deep Impact mission. But the exact composition of comet crust -- and how it forms -- remains unclear.

Gudipati and Lignell used their Himalaya cryostat instrument to slowly warm their amorphous ice mixtures from 30 Kelvin to 150 Kelvin (minus 123 degrees Celsius, or minus 190 degrees Fahrenheit), mimicking conditions a comet would experience as it journeys toward the sun. The ice had been infused with a type of organics, called polycyclic aromatic hydrocarbons, or PAHs, which are seen everywhere in deep space.

The results came as a surprise. ‘The PAHs stuck together and were expelled from the ice host as it crystallized. This may be the first observation of molecules clustering together due to a phase transition of ice, and this certainly has many important consequences for the chemistry and physics of ice,’ said Lignell.

With PAHs kicked out of the ice mixtures, the water molecules had room to link up and form the more tightly packed structures of crystalline ice. ‘What we saw in the lab -- a crystalline comet crust with organics on top -- matches what has been suggested from observations in space," said Gudipati. Deep fried ice cream is really the perfect analogy, because the interior of the comets should still be very cold and contain the more porous, amorphous ice.’”
—NASA Jet Propulsion Laboratory, “Why Comets Are Like Deep Fried Ice Cream,” February 2015 (400 words)