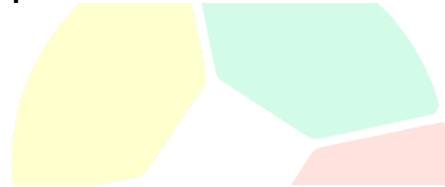


Read the article below then answer the questions that follow.

There are sentences that have been removed from the article. Choose the correct letter below that contains the sentence that best fits in the paragraph. Take note that there is an extra sentence which you do not need to use.

Edible Cactus



Shawn Jadrnicek has always enjoyed the fruit of the prickly pear cactus, so he was intrigued when he learned the plant could be utilised as animal fencing. After constructing an enclosure for his own backyard poultry, the farmer and arborist assisted South Carolina's Wild Hope Farm in installing a deer-proof fencing system around its vegetable garden. 1..... Jadrnicek claimed that as a farmer, he found the fence design to be quite useful as it not only saved him from spending for the upkeep required for fencing, but it also provided money and lasted as long as the cactus would.

Wild Hope Farm, which has developed a reputation for its prickly pear among local breweries and farmers' market regulars, sold over \$15,000 worth of fruit over the fence in 2021. The company also sells cactus pads for food and potted cactus plants. 2..... He said that not only does it produce flowers that attract pollinators, but it also produces fruit that they can harvest and sell to various brewers and cocktail merchants. Wild Hope Farm believes it's a crop they don't have to touch, but we can still make a lot of money off of it.

Nopal, or prickly pear cactus, has immense potential as a crop despite being frequently regarded as a weed. As far north as Connecticut, and as far south as Argentina, it grows naturally. It is used in a wide range of products, including cosmetics such as soaps, shampoos, and lipstick, as well as food and beverages. 3..... The United Nations has designated cactuses as the "food of the future" because they are drought-resistant, increase soil health, and mature every six months, allowing them to be harvested more quickly than most crops.

However, nopales are not yet a widespread crop. Farmers, researchers, and businesses in the United States and Mexico are collaborating to expand the cactus market. Regina Trillo, founder of Nemi Snacks, and Hector Saldivar, developer of Tia Lupita, grew up in Mexico eating cacti. After relocating to the United States, both parties chose to establish plant-based businesses. Nemi Snacks utilises them to manufacture delicious edible sticks that may easily satisfy the demand for chips or pretzels. 4.....

"We Mexicans hold the cactus in high regard. It's part of our tradition, culture, and diet," adds Saldivar, who founded Tia Lupita to combine his passion for health and wellbeing with the Mexican dishes and flavours he enjoyed while growing up in Mexico. "Nopales are depicted on the Mexican flag as a symbol of the founding of Tenochtitlan, which is now Mexico City. Not only are nopales extremely nutritious, but they are also the oldest food on the North American continent. Yet, the fruit is frequently scary, especially when sold alongside glochids, the hairlike spines found on cacti. 5..... Belk explains, "We had to educate people about what cacti are and how beneficial they are in order to establish the market."

Gerardo Martinez is concentrating on the educational aspect. **6**..... Thanks to funding from the Sustainable Agriculture Research and Education programme, he has sought to expand the niche market and educate farmers' market attendees about the advantages of nopal since 2018. "It contains a large number of minerals and nutrients," adds Martinez, who aims to increase production in 2023 in order to offer the cactus to farmers' markets on a regular basis.

Nopal can be utilised for more than just food, however. During a soon-to-be-published study at the University of Nevada, Reno, professor of biochemistry and molecular biology John Cushman discovered much to like in the plant. **7**..... The plan is to eventually replace other agricultural products. Additionally, Cushman and his group are considering it as an alternative bioenergy. In the meantime, more and more nopales are being cultivated in the United States, providing people with a taste of home and giving farmers a taste of what could be their next lucrative crop.

Choose the letter of the correct sentence that best fits the missing lines in each paragraph.

- A.** Additionally, it is a common staple meal in Mexico, where it is used in salads, salsas, sautéed with eggs, and even as a substitute for French fries.
- B.** Nemi Snacks uses cactuses to make cactus spices used in cooking.
- C.** According to Peanut Belk, head of business operations at Wild Hope Farm, the original intention was to protect the vegetable field, but the plants have served various uses.
- D.** "Cactus might be the meal of the future," says Martinez, director of multicultural engagement and inclusion at the University of Missouri–Kansas City.
- E.** "It can be used to feed animals and supplement up to 40 percent of the diets of cattle and 100 percent of the diets of sheep and goats," explains Cushman.
- F.** Wild Hope Farm discovered a method to remove these spikes from the fruits, making them safe to handle with bare hands and boosting sales, but it still needed to find customers.
- G.** On the other hand, Tia Lupita uses them as an alternative ingredient to make grain-free tortillas and tortilla chips to accompany her line of salsas.
- H.** The natural barrier was so effective that he used it in community gardens in Roanoke, Virginia, where he works as an associate extension agent for Virginia Tech.

Shrimp Eggs Are Visible to Scientists From Space

It has become somewhat cliché to express amazement that something may be seen from space, such as a wildfire, the Great Barrier Reef, or a ship blocking the Suez Canal. Occasionally, however, scientists observe something from space that is truly unexpected. **8**..... And not only can they locate these buoyant masses, but they can also identify them.

Hu and his team cannot zoom in close enough on a satellite image to view a prawn egg in the

sense that you could look at the image and declare, "That's a prawn egg!" So, how can they differentiate? The key to identifying the objects, according to Hu, is that "every floating matter has its "fingerprint." Different objects, made of different materials, reflect characteristic wavelengths of light; scientists can read these patterns using multispectral instruments mounted on satellites. **9**..... This approach is used in laboratories, and experts in the fast-developing field of remote sensing are adapting it for satellite research.

Together with experts from around the world, Hu and his team are compiling a database of what various things and materials appear like from space. So, when they encounter an unidentified floating object on a satellite image, they may compare the wavelengths that reflect those of everything previously investigated. **10**..... A visit to the Great Salt Lake in Utah, for instance, validated their hunch that the filamentous white slicks observed on satellite photographs were vast accumulations of brine shrimp eggs.

Hu's team has also published a method for recognising herring spawn in the previous year, and they are also working to identify sea snout. **11**..... According to Konstantinos Topouzelis, an environmental scientist at the University of the Aegean in Greece, "the fundamental goal is to develop an algorithm that can detect plastic waste." So that the cleaning efforts may be directed.

However, detecting plastic from space presents obstacles. **12**..... Plastic also rapidly collects and disperses. And while certain accumulations, such as the Great Pacific Garbage Patch, are enormous, many are minuscule and difficult to distinguish in pictures. Topouzelis and his students have been deploying and analysing plastic targets, such as shopping bags and fishing nets, for the past many years. The spectral characteristics of these known plastics provide a starting point for researchers who are unsure whether the swirls and swoops on other satellite photos are plastic.

At the National Technical University of Athens in Greece, oceanographer Katerina Kikaki takes a different method. **13**..... Recently, they published a collection of satellite photos that correlate to these well-known plastic accumulations. "Our data set enables researchers to investigate the spectral behaviour of plastic debris," adds Kikaki. The studies of Kikaki and Topouzelis are examples of ground truthing — analyses of known things that verify the accuracy of remote assessments.

Keeping one's gaze on the ground can greatly assist in advancing the pitch. Just based on satellite views, "my perspective is limited," says Hu. "I may contemplate a satellite image for weeks or months," says Hu. **14**..... Therefore, if you're on the sea and you admire some fascinating slime, share it on social media! An optical oceanographer may be pondering what lies beyond an image of the same region.

Choose the letter of the correct sentence that best fits the missing lines in each paragraph.

- A. Occasionally, Hu and his colleagues can only conjecture about the identification of a floating object until they have the opportunity to examine it closely.
- B. However, if a boat skipper tweets a photo of sea snout coupled with geographical information, he can save a great deal of time.
- C. First, there are numerous types of plastic, and some mix in with the water.
- D. Hu claimed that if his colleagues try hard enough, they may be able to detect whatever object from space, even specs of dust!
- E. She and her colleagues have combed through seven years of scientific articles, citizen scientist recordings, and media stories in search of instances of plastic pollution.
- F. Chuanmin Hu, an optical oceanographer at the University of South Florida, and his colleagues have devised methods for detecting aggregations of microscopic floating things, such as prawn eggs, algae, etc. from space.
- G. With this, the massive quantities of plastic that fill the oceans are another major issue that scientists think remote sensing will help solve.
- H. Spectroscopy is the process of identifying compounds using these patterns.

These Man-Made Nests Help African Penguins Beat the Heat

Scientists in South Africa have discovered that ceramic nest boxes can provide climate change protection for imperilled African penguins. In the past, seagulls placed their eggs in burrows dug through layers of their own dung that were centuries old. In the 1800s, however, traders scraped out the majority of the guano and exported it to the United Kingdom for use as fertiliser. **15**..... Shaun Welman, a naturalist at Nelson Mandela University, has witnessed penguins fighting to safeguard their eggs while sitting with their eyes closed, heads drooping, and beaks open in the oppressive noon heat.

Due to their adapted ability to retain heat in cold water, penguins frequently overheat on land. Generally, penguins leave their nests to cool themselves in the water, but without suitable burrows, their eggs are left unprotected. **16**..... Since the year 1900, the African penguin population has decreased to a measly 48,000 birds, down from as many as three million.

Fortunately, a group of scientists and environmentalists working under the African Penguin Nest Project name appear to have found a solution. Over the past four years, the team has developed and installed over 1,500 handmade ceramic nest boxes in five penguin colonies, including Bird Island in Algoa Bay, which is home to over half of the remaining African penguins in the world. **17**..... The man made nests are significantly cooler than the penguins' natural guano burrows, of which only a handful remain.

Welman and Lorien Pichegru, the acting director of the Coastal and Marine Research Institute at Nelson Mandela University, discovered that older cement nests get excessively hot. **18**..... Pichegru has found dangerously high temperatures in fibreglass artificial nests in the prior study. However, the new ceramic nests, which consisted of two moulded shells of grey cloth soaked in a ceramic slurry and assembled to resemble a miniature igloo, kept the birds cool.

The ceramic nests maintained approximately two degrees cooler than the resting body temperature of a penguin, which is 99.7 degrees Fahrenheit, while the relative humidity remained above a reasonable 70%. According to Welman, the new nests were so effective! **19**..... In a different experiment conducted on a sunny 77-degree day, the African Penguin Nest Project team recorded temperatures of over 124 degrees outside a ceramic nest box and 73 degrees within.

It appears that African penguins are significantly more sensitive to direct sunlight than previously believed, which makes the development of a feasible artificial nest all the more timely. Welman and Pichegru observed birds panting to cool themselves in temperatures as low as 72 degrees on Bird Island. Due to climate change, breeding birds in exposed places will face increasingly hazardous situations. **20**..... “Given the plight of the African penguin population, it is crucial to find effective conservation solutions,” argued Hagen.

The principal concern to African penguins is the overexploitation of anchovies and sardines, the seabirds' preferred food source. **21**..... But without sanctuary from rising temperatures and land-based predators, these efforts may not be sufficient. The use of ceramic nests could give these cherished seabirds a fighting chance.

Choose the letter of the correct sentence that best fits the missing lines in each paragraph.

- A.** A new study co-authored by Welman demonstrates that ceramic nests on Bird Island are the most effective.
- B.** Inside these cement nests, temperatures occasionally surpassed 104 degrees Fahrenheit and occasionally reached 120 degrees, placing eggs at risk of being overcooked.
- C.** The results, according to Christina Hagen of BirdLife South Africa, indicate that ceramic nests are a potentially beneficial conservation tool.
- D.** According to Welman, we have now put this entire species at risk of extinction due to human exploitation and greed.
- E.** The eggs would never be at risk of overheating and these new nests make a difference even in warmer weather.
- F.** However, the penguins have been ignoring the man-made igloos causing them to overheat.
- G.** Since then, numerous penguins have nested in the open, putting themselves at risk of heatstroke and exposing their eggs and chicks to desiccation and predators.
- H.** Scientists and activists are urging the South African government to prohibit commercial fishing near six breeding colonies of African penguins until populations recover.

The Sancocho Soup From Panama Is a Wonder Cure

Sancocho is the ideal dish for a night in. The rustic chicken stew can be savoured for breakfast, lunch, dinner, or any other meal of the day. It is the national cuisine of Panama, and many variants are popular across Latin America. **22**..... Before offering chicken strips, they provide a little portion of sancocho and rice. It is fundamental to being Panamanian."

Alba is the chef and owner of Intimo, a 20-seat restaurant in Panama City that, according to The New York Times, "lives up to its name" and shows the cosmopolitan nature of Panama through the use of local foods. **23**..... "It's a big part of who we are," Alba says, "but we also try to experiment with other things in the restaurant." Sancocho's full name is sancocho de gallina panameno. The recipe developed in the Azuero Peninsula of southwestern Panama, using both New World and Old World ingredients brought to the Americas by the Spanish.

Some Panamanians, including Alba, assert that sancocho is the most effective remedy for a hangover. **24**..... Alba grew up consuming sancocho, but it wasn't until he started his very first work that he realised what it meant to prepare it. "It was the first time I learnt about the many styles of sancocho," he explains. "My favourite part was the culinary experience. "Making it with other individuals while having a discussion is just stunning."

Alba believes that when it comes to sancocho, the fewer ingredients used, the better. "Coriander, yam, and chicken. And then you may add some garlic, onions, and oregano to make it even tastier." Technique and method are more important than ingredient complexity. "Everything from Panama that involves people coming together to cook will be a reflection of who we are as a nation," he says. **25**..... The chef is not the only one who enjoys discussing sancocho; the soup even has its own podcast.

26..... In the second edition of the podcast, named "El Sancocho", the hosts explain, in Spanish, how fundamental the soup is to Panamanian cuisine. According to Obalda, whose restaurant serves sancocho, traditional Panamanian sancocho consists of five ingredients: chicken, yam, cilantro, water, and salt. Numerous individuals include onions, oregano, celery, and other spices. Moreover, a side of rice is essential, he notes.

In the episode titled "Sancocho Talks," Obalda explains that sancocho probably did not exist before the 1800s, given the high expense of chicken at the time. The price of beef was so low in 1590 that there was a cattle crisis, he adds. **27**..... Although prices were still low, they stabilised, and beef became a key part of the local cuisine. Thus, the original sancocho was cooked using beef. Today, except for the chicken, the major flavour in the soup is the herb culantro, which is detectable in every spoonful. The yam is another essential component since it acts as a thickener and gives the soup its stew-like consistency. "Even though it's a simple recipe with basic ingredients, it's all about the details," Alba explains.

Alba believes that sancocho exemplifies Panama's culture, in that its food and the things Panamanians do are a blend of cultures from all over the world. "For example, the method through

which we marinate the chicken comes from the Caribbean and Africa, but the soup itself is present in every region," he explains. "We prepare this dish with our family. Therefore, the soup has been affected by time. Even inside Panama, several variants of Sancocho exist. For instance, Alba explains that near the Caribbean side of the country, aj chombo is typically added at the beginning of the cooking process (instead of at the end). In the jungle, plantains are frequently included. In the vicinity of Costa Rica, various tubers such as cassava and taro roots are grown in addition to the yam. What makes the sancocho so wonderful is its simplicity. And with this claim, Alba agrees. According to him, it's not that his sancocho is superior or inferior, its simplicity is what makes it so remarkable. 28..... He states, "It really pulls people together. It's similar to family bonding."

Choose the letter of the correct sentence that best fits the missing lines in each paragraph.

- A. "It's one of the possibilities offered to children during parties," explains Carlos Alba.
- B. And this is what sancocho is all about: learning and sharing.
- C. Others contend that consuming the stew on a hot day will assist to chill you down.
- D. To Alba, the most enjoyable aspect of sancocho is not eating it, but rather preparing it with his family.
- E. Therefore, they had to slaughter the majority of the cows, keep a few, and begin over.
- F. Although sancocho is not on the regular menu at Intimo, it is frequently featured on Alba's special tasting menus.
- G. Domingo de Obalda, chef and owner of El Trapiche, joins Isaac Villaverde, chef and owner of La Tapa del Coco, and Roberto Varela, musician, publicist, and amateur cook, on "Sancocho Talks" to discuss Panamanian culinary traditions.
- H. However, Alba argues that Panama's sancocho will always be superior to the others.

Ambitious Plan to Study Comet Evolution

Between the orbits of Jupiter and Neptune, at the very edge of the solar system, there are a lot of rocks and ice the size of cities that orbit the sun. 29..... The pull of Jupiter's gravity sometimes sends one of these Centaurs on a new orbit into the inner solar system. As an object gets closer to the sun, it heats up and gives off gases. One of these gases is water vapour, which comes from ice trapped inside the object. As the solar wind pushes this material away from the object, it might form a "tail," and a comet is born.

Even though more than a dozen robotic missions have studied comets and asteroids in our solar system over the past 20 years, we have never seen a comet being born. But if a big project goes forward, this will change. In a study that will be published in Planetary Science Journal, Darryl Seligman, a physicist at the University of Chicago, and his colleagues suggest that a spacecraft be "parked" near Jupiter. 30..... "If you could ride along with a comet as different ices "activated," you could watch the whole process happen in real-time," says Seligman. "Not only would you see the comet's start, but also its progress."

Seligman even has a specific target in mind: a Centaur called "P/2019 LD2 (ATLAS)" or LD2.

They're a bit like asteroids, which are generally static chunks of rock, and a bit like comets, which are more "active" due to the emission of gases as various frozen pieces of ice vaporise, in a process known as sublimation. LD2 is estimated to be about eight miles across and is currently orbiting the sun for a period of about 12 years. According to preliminary data, LD2 will have a close encounter with Jupiter in 2063, which, according to computer calculations, will likely propel the object toward the inner solar system. Once on its new path, it will be a Jupiter-family comet, a type of comet with a short orbital period that passes close to the sun every few years. **31**.....

Seligman's work looks into the properties and orbital dynamics of Centaurs and predicts that many more of these objects will be found. It also describes how a relatively cheap spacecraft could be sent to LD2. They suggest a launch date of 2061, with a rendezvous with LD2 happening soon after the spacecraft gets close to Jupiter in 2063. **32**..... For Woodney, the planned target, LD2, is one of these pure, outer-solar-system objects that would be incredibly interesting to observe, investigate, and determine its composition.

About 4.5 billion years ago, when the solar system was still forming, it was probably full of many rocky and icy bodies that were constantly crashing into each other. The biggest pieces of material became the eight major planets and the sun, while the rest of the mass of the solar system is made up of minor bodies, mostly asteroids and comets. Since LD2 hasn't come close to the sun yet, astronomers think of it as a piece of the early solar system that hasn't been changed. Its composition is very similar to that of the early solar system. Its study can help explain how the Earth and other planets were put together. Even though the first Centaur was found more than 100 years ago, it wasn't until the 1970s that astronomers started to see them as a unique group of objects. **33**..... Once they reach Jupiter's orbit, however, they enter what Jordan Steckloff of the Planetary Science Institute in Tucson, Arizona, calls a "gravitational shooting gallery."

Astronomers can better understand how Centaur populations change if they know more about how comets break up. **34**..... This knowledge could also help scientists predict how many more objects like LD2 will be pushed towards the inner solar system over the next few decades. Seligman says that even if the task he has in mind sounds hard, it could be done with tried-and-true methods. NASA's Juno mission, for example, got to Jupiter in less than five years.

Darryl Seligman also emphasises that the concept he talks about in the study is just proof that a proposal is possible. This is a pretty standard step for astronomers and physicists in the early stages of planning a space mission. In the future, a full-fledged mission concept study with dozens of scientists and engineers evaluating "everything that could possibly go wrong with a mission" may be done. This would be followed by a proposal to a space agency. In addition to learning about how the solar system came to be, it is important to study these small worlds to understand how dangerous objects in orbits that cross Earth can be. **35**..... This is also a good reason to study how comets break up: if an object breaks into, say, a dozen pieces as it passes close to the sun, and those pieces then break up on their next orbits, this would create "a greater flux of potentially dangerous debris."

Choose the letter of the correct sentence that best fits the missing lines in each paragraph.

- A. These are called "Centaur's."
- B. When a Centaur is sent toward Earth, the spacecraft would basically ride along on it.
- C. These chunks of space dust are called planets.
- D. Seligman doesn't think it's easy to rule out the possibility that a comet could one day pose a threat to Earth, even though astronomers think most comets come from the asteroid belt between Mars and Jupiter and not from the Centaur's faraway home.
- E. It is thought that they came from beyond Neptune's orbit and moved closer to us because of the pull of the big planets.
- F. For example, the faster comets break up, the faster new, more distant objects must be moving towards the Centaur region to replace them.
- G. The specific inward trajectory of LD2 cannot be determined with absolute precision, however, due to the uncertainty associated with these computations.
- H. Laura Woodney, a planetary scientist who worked on similar investigations for Centaur missions, describes the concept as "extremely interesting."

Dolphins Shrug off Hot Sauce-Spiked Nets

Fishermen throughout the world are desperate for a reliable solution to the problem of dolphins stealing their catch. The theft of fishermen's nets by dolphins, also known as depredation, costs fishermen money and puts dolphins at risk of harm and entrapment. The proposed strategies to win the battle of wits, such as the use of noisemakers or reflective concealment, have failed. **36**..... They developed fishing nets impregnated with capsaicin, the chemical component responsible for chilli peppers' characteristic spiciness.

Capsaicin-based deterrents have shown effectiveness on land with other mammalian species, including deer, squirrels, rabbits, and rodents. **37**..... However, after five months of test fishing using capsaicin-coated nets, the study team co-led by Maria Garagouni, a marine biologist at Aristotle University of Thessaloniki in Greece, was forced to face a harsh reality: their plan failed. The bottlenose dolphins that interacted with the fishermen's nets exhibited zero fear.

Despite the unfortunate outcome, Garagouni was impressed by how effectively the dolphins stole their nets. Garagouni began partnering with fishermen a decade ago to research depredation in the Aegean Sea, but the creatures' prowess still shocked her. **38**..... Frequently, the animals perform methodical missions into the nets until they have consumed enough food.

"The first thing that shocked me was witnessing it happen in real time," she recalls. **39**..... "Then came the victory laps! When there were young calves in the group, after they had eaten their fill of fish, the young ones would leap into the air as if to burn off all this new fuel. If this were our source of income, I think it would be the most frustrating thing to see, but for me, it was

obviously amazing," said Garagouni.

Does this imply that dolphins may consume hot sauce? Aurélie Célérier, a neurologist specialising in marine mammal communication at the University of Montpellier in France, asserts that it is too early to make such a determination. While it is known that many cetaceans, particularly bottlenose dolphins, lack four of the five fundamental tastes and can only detect salty, chemesthesis allows a distinct set of sensory cells to detect spicy flavours. 40..... Célérier comments that other toothed whales appear to have the necessary hardware for capsaicin detection, but there is still much to learn.

There may be something else at play in the dolphins' victory over spice: exceptional cetacean intelligence. 41..... Their penchant for innovation, along with the fact that they are notoriously opportunistic feeders, aids in their survival, but it is also a factor in their escalating confrontation with fishermen. The dolphins may have just discovered a technique to enter the nets without making much contact.

The capsaicin coating had no effect on dolphins, however, it appeared to influence another animal. 42..... Garagouni expects that the team's study will serve as a springboard for others in their quest to outsmart dolphins. She claims that even a failed study provides useful information and generates new questions.

Choose the letter of the correct sentence that best fits the missing lines in each paragraph.

- A. After placing trackers on the dolphins, researchers came to the conclusion that they need to be placed in facilities so they would not continue to take the fishermen's daily catch.
- B. Therefore, Greek experts went back to the drawing board in quest of the ideal deterrent: something so terrible that it would repel dolphins and keep them away.
- C. This process, which communicates sensations like pain and heat, is poorly understood in this species.
- D. An unnamed predator, probably a sea turtle, seal, or shark, tore enormous holes in the control nets of the scientists, but not the nets with spices.
- E. She adds that when dolphins approach a netted meal, it is more than a simple smash-and-grab operation.
- F. Dolphins are known for a wide range of sophisticated feeding methods, such as corralling fish with mud plumes and tenderising difficult prey by tossing it into the air.
- G. Even certain insects and birds appear to have an aversion to the chemical.
- H. The first time dolphins engaged with nets spiked with spicy sauce, two individuals tore 217 holes in the gear in less than 15 minutes.