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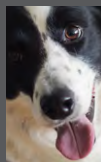
Spring 2021

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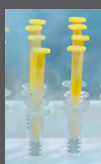
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Cold Shippers

Keep COVID-19 Vaccines Viable

By Christina P. Hooton



COVID-19 vaccines are being administered in the U.S. at a pace of 3.02 million doses per day on average as of April 20, 2021, according to the Centers for Disease Control and Prevention.¹ Rapidly distributing and administering tiny vials of life-saving medicine on such a large scale is a unique challenge.

In addition to establishing the complex supply chain required for this massive undertaking, manufacturers and distributors must store the Pfizer-BioNTech vaccine at extremely cold temperatures. Others, like the Moderna and Johnson & Johnson vaccines, must also be stored at cold temperatures. To make this possible, a cold chain, or system for maintaining distribution at low temperatures, is employed.

A New Type of Vaccine

Both the Pfizer-BioNTech and Moderna vaccines work by introducing messenger ribonucleic acid (mRNA) into the body. The mRNA shows our bodies how to create a harmless protein identical to one on the virus surface. This “spike” protein is then seen by our immune systems as “foreign,” and we develop antibodies to the COVID-19 virus. But because mRNA is somewhat delicate, it must be stored at cold temperatures.

The Moderna vaccine must be shipped at -50° to -15°C (-58° to $+5^{\circ}\text{F}$) and can be stored at that temperature for six months. Once thawed, it can be kept in a refrigerator between 2° and 8°C (36° and 46°F) for 30 days. The Pfizer-BioNTech vaccine must be shipped and stored at -70°C (-94°F), a temperature much colder than a standard freezer.²

COVID-19 Vaccines

The Pfizer-BioNTech vaccine must be shipped and stored at -80°C to -60°C (-112°F to -76°F), a temperature much colder than a standard freezer.

While mRNA vaccines have long been studied for defense against a variety of diseases, including influenza, Zika, and rabies, this is the first time this type of vaccine has been approved for use and widely distributed.

Portable Freezers

Because not every clinic or vaccination site is easily accessible or equipped to handle the storage requirements of its vaccine, Pfizer developed a new, reusable shipping container that can hold between 1,000 and 5,000 doses and keep the vaccine cold for up to 10 days.

Each “shipper” is roughly the size of a suitcase and includes a space for dry ice, room for the vaccine, and a GPS temperature-enabled tracker to provide real-time location and temperature monitoring. A control tower monitors and tracks all shipments to make sure each one arrives at the right location on time and at the right temperature. If any of these variables are negatively affected during transit, corrective action can be taken.

The boxes can be used as temporary storage for up to 30 days if new dry ice is added every five days. To store the vaccine for longer periods, ultra-cold-temperature freezers can be used. Once removed from the shipper,

the vials of vaccine can be stored in a regular refrigerator for up to five days.

Innovative packaging is just one of the many solutions contributing to one of the largest vaccination campaigns in history. It will be exciting to see what other developments we gain from this moment in time.

1. (2021, April 20). See How the Vaccine Rollout Is Going in Your County and State. *The New York Times*. Retrieved from <https://www.nytimes.com/interactive/2020/us/covid-19-vaccine-doses.html>
2. Fischetti, M. (2020, November 19). The COVID Cold Chain: How a Vaccine Will Get to You. *Scientific American*. Retrieved from <https://www.scientificamerican.com/article/the-covid-cold-chain-how-a-vaccine-will-get-to-you/>

DISCUSSION QUESTIONS

What are some of the challenges of distributing vaccines to more rural or remote areas?

How do these challenges affect fair vaccine distribution?

What are some strategies that can be used to address these challenges?

VOCABULARY

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Membrane Density Key to Water Desalination

By Iva Fedorka

Worldwide, agriculture, livestock, and energy applications consume the majority of fresh water. As sources of drinking water are compromised or harder to find, desalinating sea water can help produce a potable supply when other water treatment options are too expensive or endanger the environment.

Researchers have used a combination of electron microscopy techniques and simulations to discover that uniform density is critical to the performance of reverse-osmosis membranes.

Desalination

Desalination is the process of removing excess salts and minerals from water. Most commonly, desalination is achieved via thermal distillation or membrane distillation. In the United States, the latter is preferred.

Reverse osmosis (RO) comprises about two-thirds of all membrane distillation. The method uses a pressure gradient to force feed water through membranes that filter out salt ions.

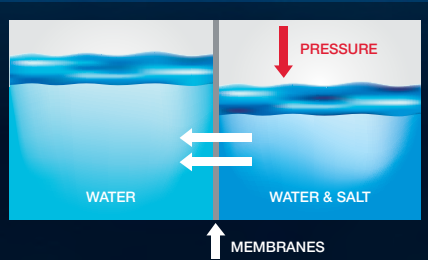
RO membranes continue to evolve, and highly permeable desalination membranes have been manufactured by controlling internal morphology, thickness, and feed surface area of the active aromatic polyamide (PA) layer. However, how the morphology was linked to performance was unknown.

New Findings

Professors Baskar Ganapathysubramanian, Enrique Gomez, Manish Kumar, and other colleagues from Iowa State and Penn State Universities and the University of Texas

at Austin used assessments of existing desalination membranes and 3D models to predict water flow. They conducted a complicated and detailed comparative analysis to understand why some membranes performed better than others.

“The simulations were able to tease out that membranes that are more uniform — that have no ‘hot spots’ — have uniform flow and



Reverse osmosis uses pressure to force feed water through membranes that filter out salt ions.

better performance. The secret ingredient is less inhomogeneity,” said Professor Ganapathysubramanian of Iowa State University.

“We’re showing how water concentration changes across the membrane,” Ganapathysubramanian said. “This is beautiful. It has not been done before because such detailed 3D measurements were unavailable, and also because such simulations are non-trivial to perform.”

The key to better desalination membranes is control during manufacturing of the membrane densities. If manufacturing engineers and materials scientists can create a uniform density throughout the membrane, water flow will increase without reducing the amount of salt removed.

“These simulations provided a lot of information for figuring out the key to making desalination membranes much more effective,” Ganapathysubramanian said.

This new research methodology quantifies membrane structure and property relationships and expands our understanding of water diffusion mechanisms and transport rate predictions. The same methods can be used for other molecular separation and polymeric systems. Improved designs can be applied not only to desalination but also to gas and hydrocarbon separations, carbon capture, and blue energy production.

Their work appears in the January 1, 2021 issue of the journal *Science*.

DISCUSSION QUESTIONS

How salty is sea water?

How does an electron microscope work?

VOCABULARY

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Comets Caught Speeding in Solar System Fast Lane

By Mike Howie

Researchers have discovered a potential fast lane for objects traveling through our solar system: a series of arches inside space manifolds that help celestial objects move substantially faster than is typical. They describe these expressways in their article, "The arches of chaos in the Solar System," published in *Science Advances*.

Stretching from the asteroid belt to beyond Uranus, the routes can push comets and asteroids from Jupiter to Neptune — over 2 billion miles, or about 25 astronomical units — in less than 10 years. They can move an object 100 astronomical units in less than a century.

"Simply put, these highways are entirely produced by the planets," said Aaron Rosengren of UC San Diego, one of the paper's authors. "Asteroids, comets, etc., are candidates to travel along them, but do not produce their own 'fast routes.' Jupiter, being the most massive body in our planetary system, is responsible for most of the structures we've discovered, but each planet generates similar 'arches' and all of these structures can interact to produce quite complicated routes for transport."

Speed Boost

The routes can be compared to the jet streams here on Earth, which pilots frequently use to fly long distances faster and more efficiently. Instead of using wind, however, the routes use gravity generated by the planets in our solar system.

Using gravity to help propel objects in space is not a new concept — both the Voyager 1 and Voyager 2 probes used gravity assists from Jupiter on their journeys to the outer edges of the solar system. Gravity assists are even well known enough to make their way into a variety of science-fiction movies. But, as the researchers conclude, "their widespread influence on natural celestial bodies has been largely undervalued and unexplored."

Crunching the Numbers

The researchers compared numerical data from millions of orbits in our solar system to known space manifolds to discover these structures. The structures themselves are incredibly complex, interacting differently as they follow the orbit of their parent planets.

Describing them mathematically can be nearly impossible, but they can be visualized in two and three dimensions with powerful computers.

Further investigation will help researchers better understand how comets and asteroids move through our solar system, which in turn could help us monitor objects that could potentially collide with Earth.

It could also prove to be an important discovery for space exploration. If space agencies can successfully guide spacecraft along this newly discovered fast lane, they could reach distant planets and the outer regions of the solar system faster than ever before, accelerating mission timelines.

EXTENSION QUESTIONS

What is the equivalent of one astronomical unit in miles?

What is the difference between a comet and an asteroid?

VOCABULARY

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Dogs Perceive Their Owners' Preferences (but do their own thing anyway)

By Gina Wynn

Dogs are commonly referred to as “man’s best friend,” but are they really? Researchers from Eötvös Loránd University in Hungary conducted a behavioral study to find out. They tested dogs’ understanding of their owners’ preferences and how they influenced the dogs’ decisions. Their results are published in *Frontiers in Psychology*.

The group wondered how dogs’ abilities compare to those of humans. “Eighteen-month-old children recognize that their own preference might differ from that of others and they understand how desire can be inferred from emotional expressions, but 14-month-olds do not. We wanted to test where dogs are on this scale,” said the study’s lead author, Eniko Kubinyi, as reported by Chrissy Sexton in the earth.com article “Dogs take their owners’ preferences into consideration.”

Dog Toy vs. Flowery Bracelet

When Kubinyi’s team observed 51 dogs interacting with their owners in the lab during the experiment, they saw similarities between the dogs and the 18-month-old children — the dogs seemed to be aware of their owners’ preferences.

For the study, the owners persuaded the dogs to choose from two items placed on a counter out of the dogs’ reach — a green, rubber ring-shaped dog toy and a plastic flower-patterned bracelet. But first, the owners of half the dogs looked at the dog toy and expressed disgust. Conversely, they showed happiness when admiring the bracelet. For the other group of dogs, the owners displayed fondness for the dog toy instead of the bracelet.

When the dogs indicated their selections, the dogs from the group where the owners reacted positively to the bracelet gazed at the bracelet for a while, considering the owner’s opinion. The dogs from the other group didn’t bother with the bracelet and looked right at the toy. Eventually, both groups ended up choosing the rubber toy.

A Dog-Eat-Dog World

The team wasn’t completely surprised by these results. “We knew that dogs respond to humans signaling their preference, but in previous studies, the dogs’ own priorities were not accounted for,” said Kubinyi. “In particular, we did not know how conflicting preferences between the dogs and the owner influence the behavior of dogs.”

We did not know how conflicting preferences between the dogs and the owner influence the behavior of dogs.

But Kubinyi does not know for sure if dogs, like 18-month-old toddlers, understand that different people can have different opinions about the same object. She is certain, however, that her team’s research is the first to show that dogs are sensitive to their owners’ choices.

Maybe that’s why so many of us consider our dogs to be our best friends. But the study suggests that like most relationships, these friendships are complicated. No matter how good your dog may be, if you expect them to always act flawlessly in your favor, you could find yourself barking up the wrong tree.

DISCUSSION QUESTIONS

If you have or know someone who has a dog, how can you tell if the dog has different preferences? Do you think the dog thinks about its owner’s preferences?

What happens when dogs are taught to obey commands like “Sit!” and “Roll over!”? Why do you think the dogs perform these tricks for their owners?

VOCABULARY

INFERRED CONFLICTING
INFLUENCE

It's a Bird! It's a Beaver!

How Evolution Shaped the Duck-Billed Platypus

By Gina Wynn



A fascinating animal, the duck-billed platypus is an obscure creature that has both duck- and beaver-like characteristics. In short, it's a furry, brown mammal with a billed snout that lays eggs. How did platypuses get to be such an anomaly? A team of international researchers led by the University of Copenhagen got some answers by investigating the platypus genome. Their findings are published in *Nature*.

Genetically, it is a mixture of **mammals, birds, and reptiles.**

By definition, mammals are warm blooded, produce milk to nourish their young, and have bodies covered with hair, a hinged jaw, and three tiny middle ear bones. Most mammals give birth to live offspring and possess specialized teeth. But platypuses are part of an exclusive egg-laying, toothless group called monotremes — along with the echidna — native to Australia, New Guinea, and Tasmania.

Genetically Unique

Because Australia, New Guinea, and Tasmania broke away from Antarctica and became islands millions of years ago, monotremes — considered a more primitive type of mammal — enjoyed a peaceful existence for a long time without being exposed to more advanced mammal competitors. This geographic isolation enabled the monotremes to thrive so we can appreciate them today and learn from their rich genetic history.

Scientists have been curious about the unique features of the platypus since Europeans discovered them in the late 1700s. The river dwellers also sweat milk, have fur that is

fluorescent in UV light, and determine sex with 10 chromosomes. In addition, they have webbed feet for swimming and venomous spurs behind the males' back legs for defense in territorial battles.

Ancestral Connections

After mapping the platypus genome using advanced gene sequencing technology, the research team gained insight into platypus reproduction. They learned that platypuses carry both vitellogenin and casein genes that enable both egg laying and milk production for feeding offspring. Typically, vitellogenin is only present in bird species and casein in other mammals.

"It informs us that milk production in all extant mammal species has been developed through the same set of genes derived from a common ancestor which lived more than 170 million years ago — alongside the early dinosaurs in the Jurassic period," said University of Copenhagen Biologist Guojie Zhang according to an American Association for the Advancement of Science news release.

Evolutionary Links

The study also revealed that the platypus's closest ancestors had teeth, but four of the eight genes for tooth development disappeared from their genome approximately 120 million years ago. The team also determined that the platypus's 10 sex

chromosomes have more in common with chickens than humans.

"Indeed, the platypus belongs to the Mammalia class. But genetically, it is a mixture of mammals, birds, and reptiles," said Guojie Zhang. "It has preserved many of its ancestors' original features — which probably contribute to its success in adapting to the environment they live in."

Though currently a protected species and classified by the International Union of Conservation of Nature as near-threatened, the duck-billed platypus's ability to adapt and evolve over time presents an unparalleled opportunity for scientists: Our duck-billed friends from Down Under may hold the key to our understanding of human evolution.

DISCUSSION QUESTIONS

What other mammals live in Australia and nearby islands that have unique characteristics that aren't shared by many other mammals?

What do you call mammals that carry their young in pouches?

Why do you think they are mostly found in and around Australia?

VOCABULARY

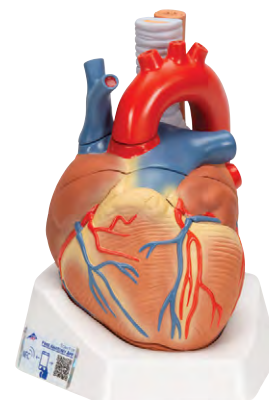
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Discover Nature and Treasure with Geocaching

By Tom Wright

Spring is here, the sun is out, birds are chirping — it's a great time to go outside, take a walk, and get some fresh air. If you've spent the past year combing the trails of your favorite local park, the paths can become predictable. Why not try new paths or even areas without paths? Welcome to geocaching!

Geocaching is basically a treasure hunt and your smartphone is the map. People have hidden caches around the world just waiting for you to discover. The predictable trails you've been hiking may have hidden caches along them for you to find.

Getting Started

An easy way to start geocaching is to download the "Geocaching" mobile app (available through Google Play or the Apple App Store) to your smartphone. Then create a free account, follow the introductory instructions, and choose a geocache in your area that interests you.

When you've selected a cache, look at the listing to get an idea of its location and the length of the hike to determine whether it's within your capabilities. You can also search online for geocaches rather than using the app. When you find one you like, enter the coordinates into your smartphone or GPS unit to figure out how to get there.

Regardless of your method of finding a geocache, you can typically find more details about the cache, including a detailed description of the route, points of interest along the way, hints for finding the cache, a description of the cache itself, and a description of the cache contents.

Grab Your Gear

Prepare for the hike before you start. If the cache is only a short walk from the parking area, the prep is easy. For longer hikes, protect yourself from the elements and the brush. Wear a long-sleeved shirt, pants, hiking boots, and a hat. Take water for hydration, a pen or pencil to sign the logbook, and any trinkets or items that you want to leave behind. A head lamp or flashlight is highly recommended if you may be out after dark. And take any other safety precautions that you would for a normal hike.

If you're a beginner and using a smartphone, be careful that your hike does not take you beyond your phone's signal. As you gain experience, try using a dedicated GPS unit for more remote geocaches. As you check to make sure you're heading in the right direction, be careful. If you're taking a longer look at your phone, stop walking for a moment to avoid tripping on branches or falling over something on the ground.

Get Outside

Now you're ready to geocache! Navigate to the latitude and longitude coordinates using your smartphone or GPS unit and start your search. Half the fun of geocaching is finding the spot once you're in the right area. You'll have to search for the cache — sometimes it will be hidden in a tree trunk, perched above you on a branch, or concealed in a shrub.

A cache is typically a weatherproof container that contains a logbook. Caches may also contain trinkets, books, pictures, or recipes. Confirm the details of your cache and leave

the appropriate items behind. When you find the cache, open it, sign the logbook, and try not to disturb its hiding place or the surrounding area. If the cache contains trinkets, you may take one and replace it with something of equal or greater value.

Some caches even have trackable items that you can take from the cache, log on the appropriate website, and place in a different cache on your next outing. The original contributor can track the progress of the item as it travels. Once you've enjoyed your discovery, return the cache to its original location and cover your tracks. Don't make the cache any easier or more difficult for the next person to find. When you've finished, head home or on to the next cache.

Ultimately, geocaching can add a new and fun twist to a traditional hike. It's a great excuse to get out and enjoy the sunshine while shaking off the winter blues.

DISCUSSION QUESTIONS

How are latitude and longitude measured?
What is the origin of the GPS system?

VOCABULARY

GEOCACHING CACHE GPS
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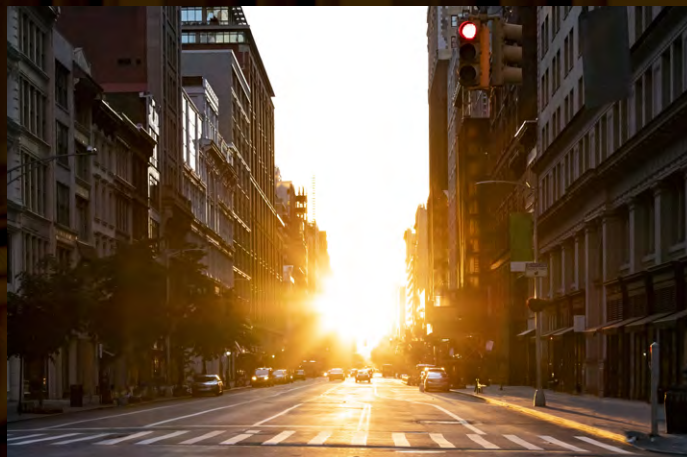
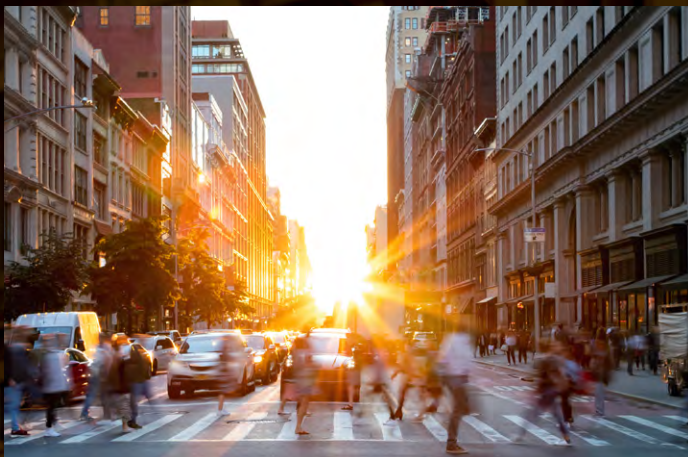


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Pandemic Data May Help Scientists Understand Air Pollution

By Kylie Wolfe



Places like New York City, known for sidewalks packed with people and streets crowded with cars, were unusually quiet in 2020. As the pandemic disrupted everyday activities, temporary shutdowns laid the groundwork for an unprecedented environmental experiment.

Cities around the world suffer the effects of air pollution, a health hazard that's often invisible but sometimes seen in the form of smog. Scientists are collecting new data to better understand this issue and what can be done to solve it. They reported their preliminary findings at the American Geophysical Union (AGU) annual meeting last December.

Recording New Data

Working from home and limiting travel this past year meant less traffic and a decrease in vehicular emissions. This led to lower levels of greenhouse gases. According to "Global Carbon Budget 2020," monthly carbon dioxide emissions decreased by 17 percent globally. By December, emissions were on the rise again but still down 7 percent compared to 2019.

New York City alone experienced a 21 percent reduction in nitrogen dioxide between March and July 2020 as reported at the AGU fall meeting. This downward trend temporarily improved air quality in the city, but it didn't resolve the long-term problem: carbon dioxide can remain in the Earth's atmosphere for hundreds of years.

Understanding Air Pollution

Nitrogen oxides, volatile organic compounds, and methane are gases that contribute to ground-level ozone, a pollutant in smog. When levels are high, lung damage and other respiratory complications can occur. This differs from stratospheric ozone which is found in the upper atmosphere and protects us from the sun.

Scientists are collecting new data to better understand this issue and what can be done to solve it

Scientists began comparing concentrations of the aforementioned gases and noticed a seasonal difference. It wasn't until summer, after the pandemic's restrictions had been in place for a couple months, that researchers could connect a decrease in nitrogen dioxide with a decrease in ground-level ozone.

What had occurred was a photochemical reaction in the atmosphere. Sunlight and heat, characteristics of summer, interact with gases like nitrogen dioxide. The result is toxic and led Dan Jaffe, environmental chemist at the University of Washington Bothell, to point out

that policy makers could better target their regulations, limiting nitrogen oxide emissions in the summer for a greater environmental impact.

Solving a Complex Problem

Scientists also saw differences in pollution by location. For example, the changes experienced in New York City weren't as dramatic in Denver. End-of-summer wildfires added to air pollution there, reversing much of the pandemic's impact. These natural disasters increase ozone levels, adding nitrogen oxides, carbon monoxide, and other particles to the mix.

Cities like Denver provide proof that air pollution is a complex problem. As society plans for post-pandemic life, scientists now have a unique set of data that can be used to help affect change and make a difference for our planet.

DISCUSSION QUESTIONS

- What other factors contribute to air pollution?
- What's the difference between stratospheric and ground-level ozone?
- How can we help reduce emissions now and in the future?

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Smartphones in the Social World

By Mike Howie

It is the era of the smartphone. They seem to be everywhere — in every pocket and purse, intrinsically connected to every thumb, ear, and eyeball. At times they're useful. Other times they're distracting. But how do they affect our real, in-person, face-to-face social lives?

Researchers at the Norwegian University of Science and Technology (NTNU) studied people in cafés — spaces designed for socializing — to figure out why we so frequently reach for our phones when we're with other people. Their article, "The Constitutive Practices of Public Smartphone Use" published by MDPI, details findings from interviews with 101 people and observations of 108 social situations in cafés. The researchers found three primary functions of smartphone use:

- Pause a conversation
- Shield interaction
- Share something with others

Hold, Please

Pausing a conversation to check your phone may seem rude, but that isn't always the case. It depends on how you do it, suggests Professor Aksel Tjora of NTNU, one of the authors of the study.

"If you explain to the person you're with why you have to postpone your physical interaction, it's perceived as more polite than if you just disappear," Tjora said. "At the same time, some people may appreciate a short break from a longer conversation, and using

Pausing a conversation to check your phone may seem rude, but that isn't always the case. It depends on how you do it.

the phone can also be a natural, interwoven part of the social interaction that takes place in the café."

Shielding interaction is more subtle. In a group, it can be used to avoid a certain topic. In one-on-one interactions, it can be used to show that you're similarly busy while your partner checks their phone. It can even be used as an excuse to physically step away from an interaction.

Take a Look at This

As opposed to the first two functions, sharing content enhances an interaction. For example, you might look up a fact to fill in gaps in the conversation, or you might share a picture to show what words alone can't convey.

There are, of course, other uses for smartphones in and around social interactions. Before meeting, you might use it to kill time while waiting for your partner to arrive or, alternatively, ask where in the café your partner is sitting. Perhaps you check the time or missed messages during a natural pause or change in conversation, when people generally find smartphone use to be acceptable. And,

of course, smartphones are useful for taking pictures both separately and together.

Our relationships with smartphones are complex. With so much functionality crammed in one small device, they can easily be seen as hindrances to socializing. But that's not necessarily true. They can, in fact, be very real social tools.

DISCUSSION QUESTIONS

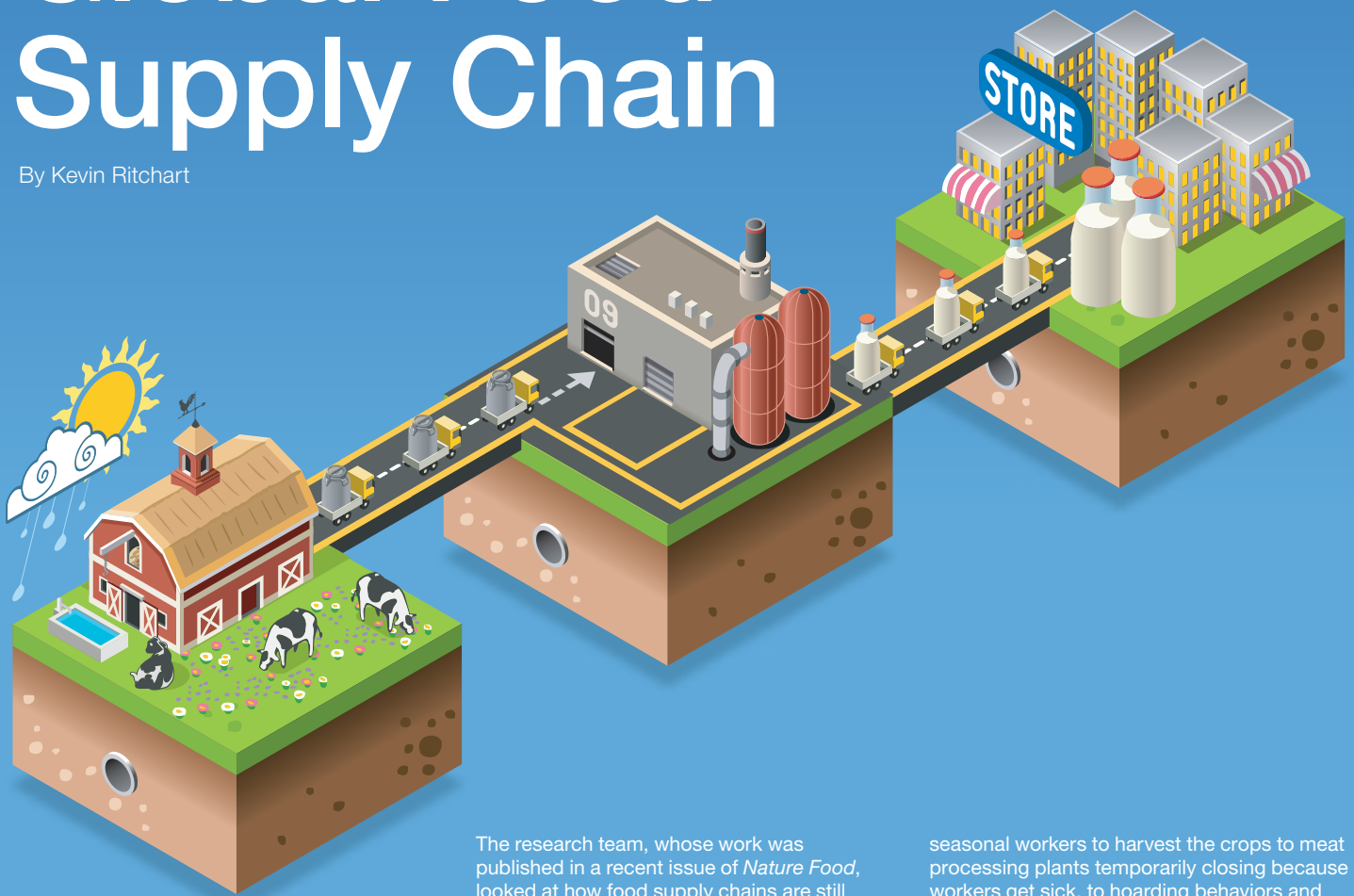
- Do you use your phone while spending time with friends? If so, how?
- Are there any unspoken rules about using phones while with other people?

VOCABULARY

INTRINSIC PHUBBING

Studying the Stability of the Global Food Supply Chain

By Kevin Ritchart



As the world becomes more globalized, one of the primary ways countries have come to rely on each other is through the creation of a food supply chain.

With technology allowing products to be shipped between countries around the world, food produced in one country is often consumed elsewhere.

Being a part of this intricate, interconnected network has many benefits. For instance, if the United States routinely imports food from several other countries and one of these countries stops sending food, there are typically many other places the United States can contact to obtain those same products.

Shocking the System

But, as the COVID-19 pandemic has shown us, the food supply chain can be vulnerable when exposed to unexpected changes. A recent study examined how environmental shocks affected the food supply chain and looked at ways for it to become more resilient.

The research team, whose work was published in a recent issue of *Nature Food*, looked at how food supply chains are still able to function during everything from floods, droughts, and extreme heat to pest infestations, disease outbreaks, and more.

The food supply chain can be vulnerable when exposed to unexpected changes.

Kyle Davis of the University of Delaware led the study. His team's main motivation was to understand what's currently known about disruptions to the food supply chain and investigate how problems at one step in the chain can affect subsequent steps.

The steps Davis and his team looked at during the study were food production, storage, processing, distribution and trade, and retail and consumption. This work is especially timely, given that the COVID-19 pandemic has shown the world how the food supply chain can still function under extreme stress.

"COVID-19 has affected all steps in the supply chain simultaneously, from not having enough

seasonal workers to harvest the crops to meat processing plants temporarily closing because workers get sick, to hoarding behaviors and runs on grocery stores," Davis said.

Keeping the Chain Connected

Overall, the goal of his team's work is to help policy makers and businesses strengthen their supply chains and become more capable of predicting and absorbing shocks.

Future research in this area will likely include further understanding the overall number of people affected at each step of the food supply chain, the impact of multiple shocks occurring at the same time, and finding a way to quantify the countries' abilities to substitute products when there are shortages.

DISCUSSION QUESTIONS

Aside from those mentioned in the article, what are some other environmental shocks that could affect the food supply chain?

What kinds of products became harder to find during the COVID-19 pandemic?

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The Kids Are Alright

Emotional Effects of COVID-19

By Andie Spevetz, MSPC

While the COVID-19 vaccine rollout provides hope for an end to distance learning, some mitigation efforts may continue through the year. As social distancing continued over the past year, students, teachers, and parents have recognized an increased lack of interest from students. The question is, “Why?”

The non-profit Youth Truth Survey¹ conducted a poll that confirms what we already know: many kids are struggling right now. Teens report a lack of interest, feeling that they aren’t learning anything, and a growing sense of anxiety and despondency about both the present and the future. What’s causing these feelings? Could it be more than just boredom and monotony?

To answer these questions, let’s first explore the definition of clinical depression. Someone diagnosed with depression must display at least five of the following symptoms for most of the day, on most days for a minimum of two weeks²:

- Low mood — a feeling of sadness or despondency
- General apathy toward life; loss of interest in things that previously gave pleasure
- Noticeable changes in appetite; weight loss or gain
- Slowed thoughts or movements or restlessness unrelated to activity level
- Persistent tiredness regardless of the amount or quality of sleep; sleeping too much or too little
- Feelings of guilt, worthlessness, being a failure, or letting people down; irritability
- Inability to think, concentrate, focus, remember, or process information
- Thoughts of suicide or self-harm; planning ways to die with or without intent to act

Depression affects an estimated 10 to 20 percent of the population each year.³ Students’ current feelings do not necessarily indicate a serious mood disorder but rather monotony related to the global pandemic.

Mood Boosters

Here are five ways to improve the mood and interest of students that can be useful to parents and teachers. While educators have little control over what students are doing at

home, more than 40 years of parent-teacher associations have shown that collaboration between home and school can help.⁴

1. Get outside.

Studies have shown that being outside has mood-lifting benefits.⁵ A task or lesson that requires children to be outside can capitalize on the natural benefits and endorphins produced by movement.

2. Shake it up.

Whether random, planned, or scheduled, activities should be varied to make each day a different experience. Each week should also not be exactly the same as the last week. Spontaneity is important for emotional growth and building time-management skills.

3. Don’t learn in the bedroom.

Sleep experts recommend that bedrooms should be used only for sleep and not for reading, falling asleep to the television, or playing games. Learning and sleeping in the same place can prevent children from doing well in both activities. Although space considerations may limit implementation of this tip and learning can take place in any environment, at any time, sharing this suggestion can help kids take a fresh look at their lives and choices.

4. Take frequent breaks.

Get up and encourage students to do the same. Take a walk outside, go to the bathroom, or have a healthy snack to help refresh your mind. Try to avoid highly processed foods that can negatively affect energy levels. Offer extra credit for kids who come back to class with a rock, a leaf, or an earthworm.

5. Ask questions and then ask more questions.

If possible, while teaching remotely, encourage camera use, call students by name, and ask them to “stay late” to discuss what’s going on. Remember, it only takes one person to make a difference

for a child who is struggling. Ask for help from outside the classroom: add phone numbers for local warm lines (non-crisis) and the Substance Abuse and Mental Health Services Administration’s (SAMHSA) National Helpline (1-800-662-HELP) on landing pages or teachers’ home pages. Don’t hesitate to talk about how students are doing as a class and let them know they are not alone.

The world has changed, and it may be a while before the remote classroom goes away. The most important thing is to help kids weather current and future disruptions.

Andie Spevetz has a Master of Science in professional counseling from Carlow University. She is the groups facilitator for Anchorpoint Counseling Ministry, a small non-profit organization in the North Hills of Pittsburgh, Pennsylvania. In addition to running groups that help students and parents navigate ADHD, social skills, and remote learning, she is an outpatient therapist for adolescents and is helping to reopen the organization’s training and CEU program. She can be reached for questions and comments at aspevetz@anchorpointcounselingministry.org.

Many kids are struggling right now. Could it be more than just boredom and monotony?

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DISCUSSION QUESTIONS

What remote learning activities can help students get out of their normal setting?

In what ways can a traditional classroom be simulated digitally?

VOCABULARY

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