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Regulatory Update

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ASIA PACIFIC

Singapore Environmental Protection and Management Regulations updated

2020-07-02

The following substance has been added to the Hazardous Substances Schedule of the Singapore Environmental Protection and Management (Hazardous Substances) Regulations as per S 537/2020:

Chloropicrin

The amendment will come into operation on 1 October 2020.

Yordas Hive, 2 July 2020

<https://www.yordashive.com/news/article/944>

22 October 2019

China finalizes the long-awaited cosmetic supervision and administration regulation

2020-06-30

On June 29, the new fundamental cosmetic legislation-*Cosmetic Supervision and Administration Regulation (CSAR)*, was officially published by the Chinese State Council to replace the existing *Cosmetics Hygiene Supervision Regulations (CHSR)*, which was firstly released in 1989. The new regulation is scheduled to be effective on **January 1, 2021**.

Encompassing 6 chapters with 80 articles, the new CSAR is designed to overhaul the outdated regulatory framework and address issues revolving around cosmetic pre-market and post-market management in new situations, such as cosmetic classification, new ingredient management, efficacy evaluation, safety assessment, online cosmetic supervision, accountability system, and punitive measures.

REACH 24, 30 June 2020

<https://www.reach24h.com/en/news/industry-news/breaking-news-china-finalises-the-long-awaited-cosmetic-supervision-and-administration-regulation.html>

The following substance has been added to the Hazardous Substances Schedule of the Singapore Environmental Protection and Management (Hazardous Substances) Regulations as per S 537/2020:

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Australian chemical research fined \$25,200 for alleged breaches in relation to hand sanitiser

2020-06-29

The Therapeutic Goods Administration (TGA) has issued two infringement notices totalling \$25,200 to Sydney-based company Australian Chemical Research Pty Ltd for alleged breaches of the Therapeutic Goods Act 1989 (the Act).

Australian Chemical Research allegedly manufactured and supplied antibacterial/anti-viral hand sanitiser not included in the Australian Register of Therapeutic Goods (ARTG), and which was neither an exempt good nor a good that is excluded from the operation of the Act. Unless a specific exemption, approval or authority applies, therapeutic goods must be entered in the ARTG before they can be lawfully manufactured or supplied in Australia.

The company allegedly claimed the hand sanitiser kills 99.99% of germs, viruses and bacteria on hands, including the flu virus, the common cold virus and HIV. The label also stated that the active ingredients of the hand sanitiser included 80% iso-propanol. However, the product contained a large percentage of n-propanol, which is a less effective and potentially hazardous alcohol. Australian Chemical Research was not licenced to manufacture therapeutic goods, and did not have approval to do so.

The TGA reminds hand sanitiser manufacturers that these products are, in most cases, therapeutic goods, unless they have been excluded from the operation of the Act. Sanitisers excluded under the Therapeutic Goods (Excluded Goods - Hand Sanitisers) Determination 2020 must meet specific formulation, labelling and advertising requirements and cannot be promoted with claims about anti-viral action. Under the Therapeutic Goods (Excluded Goods) Determination 2018, antibacterial skincare products are also specifically prohibited from being presented as having anti-viral action.

The TGA has published Hand sanitisers: Information for manufacturers, suppliers and advertisers.

The TGA takes action against unlawful activity

The regulatory scheme is important to the safety of Australian consumers, and the TGA investigates suspected unlawful activity in relation to therapeutic goods. A range of compliance and enforcement tools are available and where necessary, this may include criminal or civil

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court proceedings, which can result in substantial penalties, fines or imprisonment.

If you suspect non-compliance, you can report illegal or questionable practices online to the TGA.

Hand sanitisers: Information for consumers will help you understand more about buying and using hand sanitisers amid the coronavirus (COVID-19) pandemic.

TGA, 29 June 2020

<https://www.tga.gov.au/media-release/australian-chemical-research-fined-25200-alleged-breaches-relation-hand-sanitiser>

AMERICA

TSCA current chemical risk management activities amended

2020-07-01

The U.S. Environmental Protection Agency (US EPA) has added the following substance to the list of Current Chemical Risk Management Activities:

Per- and Polyfluoroalkyl Substances (PFASs)

Yordas Hive, 1 July 2020

<https://www.yordashive.com/news/article/943>

EPA registers NSPW Nanosilver as materials preservative

2020-07-02

The U.S. Environmental Protection Agency (EPA) announced on July 2, 2020, that it registered NSPW Nanosilver as a new active ingredient that helps suppress odor-causing bacteria, and algae, fungus, mold, and mildew that can cause deterioration or staining in textiles. EPA notes that NSPW Nanosilver is registered only for use in specified textiles, including fabrics, sportswear, footwear, linens, and awnings. NSPW Nanosilver is the active ingredient in the pesticide product POLYGUARD-NSPW MASTER BATCH (Polyguard). According to EPA, Polyguard will be formulated as a master batch, meaning that NSPW Nanosilver will be embedded

Environmental Protection Agency (US EPA) has added the following substance to the list of Current Chemical Risk Management Activities:

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within plastic beads or pellets. EPA states that these beads or pellets “are polymeric materials similar to nylon or polyester which are incorporated/infused into textiles through a closed-loop manufacturing process called extrusion.” Once introduced into the process, no beads or pellets can escape into the environment. Available data indicate that the leach rate of nanosilver derived from NSPW Nanosilver-treated textiles is below the limit of detection; the potential for environmental exposure of the polymer is presumed to be negligible.

EPA notes that NSPW Nanosilver was the active ingredient in a previous conditional registration granted in 2015 for use as a materials preservative in textiles and plastics. As reported in our May 31, 2017, memorandum, that registration was challenged, however, and the U.S. Court of Appeals for the Ninth Circuit vacated it on grounds that EPA’s public interest finding for granting the registration was unsupported in the record. EPA states that the current action has a modified use pattern that is expected to limit exposures compared to the previous conditional registration. According to EPA, additional data were submitted and reviewed to update the risk assessment for NSPW Nanosilver, allowing for an unconditional registration.

EPA states that based on its human health and ecological risk assessment, it has determined that the new active ingredient, NSPW Nanosilver, meets the regulatory standard under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) for use as a materials preservative in textiles in Polyguard. Although EPA includes a link to Docket ID EPA-HQ-OPP-2020-0043 to view the product registration and response to comments, those materials are not yet posted in the docket.

Bergeson & Campbell, 2 July 2020

https://nanotech.lawbc.com/2020/07/epa-registers-nspw-nanosilver-as-a-materials-preservative/?utm_source=Bergeson+%26+Campbell%2C+P.C.+--+Nano+and+Other+Emerging+Chemical+Technologies+Blog&utm_campaign=7719e2cc92-RSS_EMAIL_CAMPAIGN&utm_medium=email&utm_term=0_9a895e87b2-7719e2cc92-73807113

New US limit on lead dust not what the doctor ordered

2020-07-01

The EPA strengthens regulations for lead paint cleanup but doesn’t use the latest science to protect children from lead poisoning

While the proposed standard is a significant improvement over the old one, it is twice as high as the level that health experts have called for.

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The US Environmental Protection Agency (EPA) on June 17 proposed tightening its standard for how much lead dust can be left on floors after contractors remove lead paint from homes and childcare centers. While the proposed standard is a significant improvement over the old one, it is twice as high as the level that health experts have called for.

Exposure to lead is considered unsafe at any level. Lead causes irreversible neurological damage to children, leading to attention deficit disorders and loss of IQ. Children are most likely to get poisoned by nibbling on chips of old leaded paint, which tastes sweet, and ingesting minute lead-paint particles in floor dust. Low-income and minority children are disproportionately affected.

While average blood lead levels of children have plummeted in the US since the 1970s, when regulators began to limit the amount of lead in house paint, chronic low-level poisoning continues. At least half a million children ages 1–5 years have blood lead concentrations above the level at which the US Center for Disease Control (CDC) recommends that parents and others take action to reduce a child’s exposure. About 24 million homes still have lead paint.

When contractors remove lead paint from homes, they test the success of their job by marking out a square foot (0.09 m²) of floor, scooping up lead dust with a special wipe, and sending the wipe off to a lab for analysis. The EPA’s new rules will get homes cleaner after lead abatement and reduce lead poisoning by allowing 10 µg/ft² (about 110 µg/m²) of lead on floors after cleanup, down from the 2001 standard of 40 µg/ft² (430 µg/m²).

Chemicals and Engineering News, 1 July 2020

<https://cen.acs.org/policy/chemical-regulation/New-US-limit-lead-dust/98/i26>

US EPA’s Covid-19 enforcement policy to end 31 August

2020-07-02

The US EPA will discontinue by 31 August its temporary policy to exercise ‘enforcement discretion’ for companies that fail to meet routine environmental reporting and monitoring requirements due to disruptions caused by the Covid-19 pandemic.

The end date “recognises that the circumstances surrounding the temporary policy are changing, but also ensures that there is adequate time to adjust to the changing circumstances,” according to a 29 June

“As state and local restrictions are relaxed or lifted, so too may the restrictions that potentially impede regulatory compliance, reducing the circumstances in which the temporary policy may apply,” it said.

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memorandum from EPA Office of Enforcement and Compliance Assurance (Oeca) assistant administrator Susan Parker Bodine.

The temporary policy, originally announced in late March, had sparked widespread concern that it would be used as a 'licence to pollute'. The EPA, however, defended its decision, saying that it expected companies to continue to comply with their regulatory obligations, and it was intended to ensure that the agency could focus its resources on the most critical issues.

Since then, new federal guidelines and directives have been issued and many parts of the country have taken steps to return to normal operations, said the memorandum ending the policy.

"As state and local restrictions are relaxed or lifted, so too may the restrictions that potentially impede regulatory compliance, reducing the circumstances in which the temporary policy may apply," it said.

The agency said it might decide to suspend the policy before 31 August.

It also retains the ability to "exercise enforcement discretion on a case-by-case basis regarding any noncompliance, including noncompliance caused by the Covid-19 public health emergency, before or after the temporary policy is terminated."

Chemical Watch, 2 July 2020

<https://chemicalwatch.com/>

EUROPE

BPR union list updated with 2 expired active substance approvals

2020-07-02

On 30 June 2020, the Biocidal Products Regulation (BPR) Union List was updated with the following expired active substance approvals:

Thiabendazole

Product type 8 (wood preservatives)

Thiamethoxam

Product type 8 (wood preservatives)

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This brought the number of expired active substance approvals to 8.

Yordas Hive, 2 July 2020

<https://www.yordashive.com/news/article/945>

New coal law will be 'canary in a coal mine' moment for German presidency

2020-07-02

As Germany takes the helm of the EU, its problematic coal law risks sending out the wrong signals, writes Riccardo Nigro.

Riccardo Nigro is the campaign coordinator for Coal Combustion and Mines at the European Environmental Bureau (EEB), a green campaign group.

The German presidency of the EU could not have started at more crucial times. While Europe gears up to recover from the corona crisis, the climate emergency has become increasingly pressing – May 2020 was the hottest month on record – and according to the IEA the world has six months left to change its course.

Leading the EU towards the post-COVID world will require the German presidency to be pragmatic and imaginative; bold policies to protect people's health, relaunch the economy and boost employment must be coupled with a green transition that will make our ecosystems and societies more resilient.

However, when it comes to coal, premises are not encouraging. At the very same time as Germany takes the helm of the EU, the Bundestag could approve the law shaping the German coal phase-out by 2039.

This law is outdated and unambitious and risks setting a bad example for other member states which are delaying a necessary and overdue coal exit.

First, the 2039 deadline is too late. Coal is a major contributor to climate breakdown and must be phased out by 2030 at the latest for the world to have a chance to keep the rise in global temperatures below 1,5°C.

Last spring, Members of the European Parliament overwhelmingly called on governments to stop burning coal by 2030. The same date was set as a benchmark by the OECD.

Coal is a major contributor to climate breakdown and must be phased out by 2030 at the latest for the world to have a chance to keep the rise in global temperatures below 1,5°C.

This brought the number of expired active substance approvals to 8.

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The German model is already inspiring other countries to postpone their coal exit; Polish operator PGE is considering to withdraw its “entire hard fleet in 20-25 years” – that is, 10 to 15 years too late.

Moreover, the recent opening of a new plant by German operator Uniper in Datteln has further spread the message that coal has still a role to play in Europe’s future.

At the same time, the law provides that Berlin pays €4,35 billion to compensate coal utilities for lost revenues. However, German utilities already benefit from massive direct and indirect subsidies, quantified in €5,6 billion per year in terms of health and other air pollution-related costs.

Germany could save up to €5.4 billion per year in air pollution damage cost by just enforcing the strictest air pollution limits for large combustion plants laid down by EU regulation (LCP BREF).

This would also trigger anticipated shutdowns of the most polluting utilities as soon as 2021, with additional benefits for the climate. On the contrary, the German Ministry for the Environment has been defending the interests of the coal industry by applying the absolute minimum level of protection allowed by EU rules.

Indirect subsidies also include the exemptions from repairing the damages caused by coal mining and burning to water bodies. This is the case of the Frankfurt-Oder region, where LEAG’s mining operations in the Lausitz area are forcing the local public water provider to invest €10 million to desulphurise drinking water, which LEAG does not intend to pay back.

According to ClientEarth, not only could the law be rejected by the European Commission for providing state aids to coal giants, it will also recklessly allow LEAG’s coal plants to extend their life-span, as well as to continue its operations thanks to taxpayers’ money.

This would not be the first time the German coal sector is bailed out by public money: national coal has been used in German power plants for decades only because its price was kept artificially low by the state.

Now Germany is about to grant billions euro to coal operators for sticking to business as usual scenarios, and even delaying the already planned closure of certain facilities. We could call this a ‘polluter gets paid’ twist:

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instead of holding polluters accountable for the burden they inflict on citizens, Germany is using state aid to keep their outdated business alive.

Eurativ, 2 July 2020

<https://www.euractiv.com/section/climate-environment/opinion/new-coal-law-will-be-canary-in-a-coal-mine-moment-for-german-presidency/>

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REACH Update

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EC amends REACH Annex II to include SDS requirements for Nanoforms

2020-07-01

On June 26, 2020, the European Commission (EC) published a regulation in the *Official Journal of the European Union* that amends Annex II of the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) regulation. Annex II describes the requirements for compiling safety data sheets (SDS). The EC notes that specific requirements for nanoforms of substances took effect on January 1, 2020, and that information related to those requirements is to be provided in SDSs. The Annex II amendments include the following provisions regarding nanoforms:

- If the SDS pertains to one or more nanoforms, or substances that include nanoforms, this must be indicated by using the word “nanoform”;
- If the substance is registered and it covers a nanoform, the particle characteristics that specify the nanoform, as described in Annex VI, must be indicated;
- If the substance is not registered, but the SDS covers nanoforms, the particle characteristics of which have impact on the safety of the substance, those characteristics must be indicated;
- If the substance as used in the mixture is in nanoform and is as such registered or addressed by the downstream user chemical safety report, the particle characteristics that specify the nanoform, as described in Annex VI, must be indicated. If the substance as used in the mixture is in nanoform but is not registered or addressed by the downstream user chemical safety report, the particle characteristics that impact the safety of the mixture must be provided;
- As regards nanoforms, the dissolution rate in water or in other relevant biological or environmental media must be indicated in addition to the water solubility; and
- As regards nanoforms of a substance for which the n-octanol/water partition coefficient does not apply, the dispersion stability in different media must be indicated.

Other Annex II amendments include aligning the SDS requirements with the sixth and seventh editions of the Globally Harmonized System of Classification and Labeling of Chemicals (GHS). The Annex II amendments

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will apply beginning **January 1, 2021**. SDSs not complying with the amended Annex II requirements may be used until **December 31, 2022**.

The National Law Review

<https://www.natlawreview.com/article/ec-amends-reach-annex-ii-to-include-sds-requirements-nanoforms>

EU inspectors to check consumer products for hazardous substances

2020-07-01

The Enforcement Forum agreed that its major enforcement project planned for 2022 (REF-10) will focus on integrated checks of products that control several duties from different pieces of legislation – mostly related to articles, but also to mixtures. Most of the products are expected to be consumer products.

Helsinki, 1 July 2020 – Inspectors will check that the products comply with restrictions for selected hazardous substances under REACH. The controls will also check whether products comply with restrictions for the presence of persistent organic pollutants defined under the POPs Regulation. Specific substances to be covered by these checks will be decided in 2021 and could potentially include for example phthalates or PFOS.

Enforcers will also check REACH duties for substances in articles requiring that information on substances of very high concern in products is being communicated in the supply chain.

These duties under REACH and POPs will be checked for specific types of material such as rubber, plastic or textiles. In this way each product can be controlled for several REACH or POPs requirements which will broaden the scope of controls and strengthening the protection of EU citizens and the environment. This enforcement project will be prepared in 2021, with inspections conducted in 2022 and the report expected at the end of 2023.

The Forum also set timelines for the pilot project on the classification of mixtures, which will focus on classification of detergents and cleaning products. The preparation for this project will start at the end of 2020, with inspections taking place in 2021 and 2022 and the report expected in 2023.

These duties under REACH and POPs will be checked for specific types of material such as rubber, plastic or textiles.

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REACH Update

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Ms Katja vom Hofe (Germany) was re-elected as the Forum's Chair and *Ms Sinead McMickan* (Ireland) as the Vice Chair. *Mr Henrik Hedlund* (Sweden) was also elected as the Forum's Vice Chair.

The Forum for Exchange of Information on Enforcement met virtually on 22-25 June 2020.

ECHA, 1 July 2020

<https://echa.europa.eu/-/eu-inspectors-to-check-consumer-products-for-hazardous-substances>

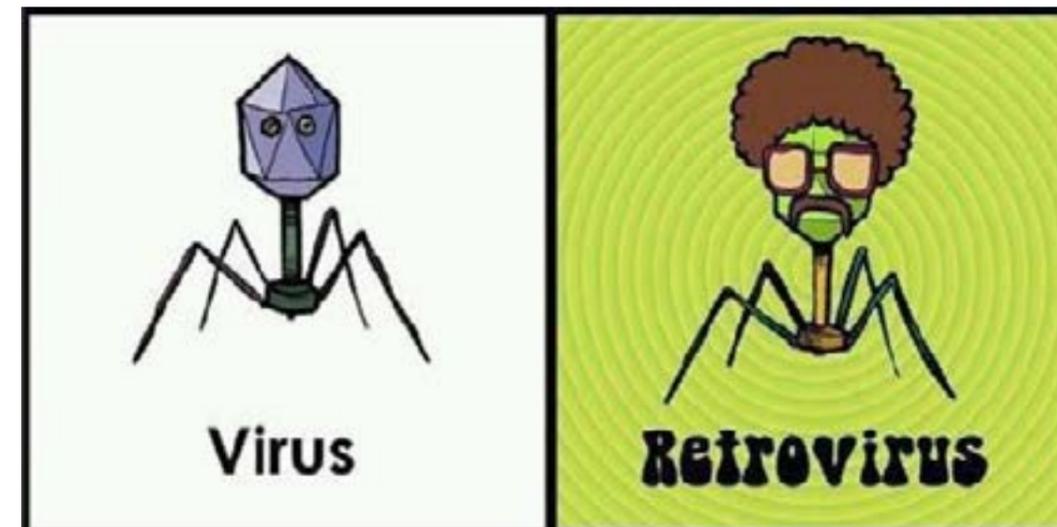
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Janet's Corner

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(Retro)virus

2020-07-10



<https://www.pinterest.com.au/pin/229402174739620434/>

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Hazard Alert

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Chlorpyrifos

2020-07-10

Chlorpyrifos is an insecticide. Pure chlorpyrifos is made up of white or colourless crystals. It has a smell similar to sulphur—like rotten eggs. The insecticide was first registered on the market in 1965. [1,2]

USES [1,2,3]

Chlorpyrifos is an organophosphate insecticide, used on many different insects, including termites, ants, roundworms and mosquitoes. It works as a nerve inhibitor on the insects, affecting their cholinesterase (ChE) enzyme pathways. It was banned for home use in the US in 2006, however it is still found in insect baits. Currently, it is widely used across golf courses and farms for insect control. Products containing the insecticide are also used to treat wooden fences and utility poles.

ROUTES OF EXPOSURE [1]

- People can be exposed to the insecticide by eating it, inhaling it, or getting it in their eyes or on their skin.
- Pets or people can be exposed to chlorpyrifos if a bait station inside their home is broken.
- Well water contamination could be a way of exposure. This would happen if the insecticide was used to control insects near the well, and it seeped into the water supply.
- Symptoms of exposure can appear within minutes to hours of being exposed.

HEALTH EFFECTS

Chlorpyrifos poisoning affects a range of systems including the integumentary and respiratory systems.

Acute Effects [1]

Severity of symptoms depend on the level and type of exposure.

- Chlorpyrifos exposure can result in a runny nose, increased saliva or drooling, and tears.
- Acute exposure to the insecticide could result in headaches, nausea, dizziness and sweat.

Chlorpyrifos is an insecticide.

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Chronic Effects [1]

Chlorpyrifos is toxic to multiple body systems. Long-term exposure to the insecticide could result in vomiting, cramps, muscle weakness, twitching and tremors, and loss of co-ordination. It can also cause blurred or darkened vision, diarrhoea, unconsciousness, convulsions, loss of bladder and bowel control, difficulty breathing, and paralysis.

SAFETY

First Aid Measures [4]

- Ingestion: DO NOT INDUCE VOMITING. Immediately contact a healthcare professional.
- Skin contact: Immediately wash affected area with plenty of water for at least 15 minutes. Remove contaminated clothing; do not re-wear until it has been thoroughly de-contaminated. Immediately contact a healthcare professional—but only after exposed skin has been thoroughly de-contaminated.
- Eye contact: Hold eyelids open, and rinse eyes for at least 15 minutes. Immediate medical attention is required.
- Inhaled: Take victim to the nearest fresh air source and monitor their breathing. If they are not breathing (and you are qualified), perform CPR with the aid of a pocket mask or one-way valve. Contact a medical professional immediately.
- General: Never administer anything by mouth to an unconscious, exposed person.

Exposure Controls/Personal Protection [4]

- Engineering controls: Emergency eyewash fountains and safety showers should be accessible in the immediate area of the potential exposure. Ensure there is adequate ventilation. Whenever possible, material should be handled in a laboratory.
- Personal protection: Cotton overalls, a washable hat, elbow-length PVC gloves, and a face shield or goggles. Wear resistant footwear, such as rubber or plastic boots. For specifications on PPE, check regulations in your jurisdiction.

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REGULATION [5]

United States:

The Occupational Safety and Health Administration (OSHA) has set an 8-hour time weighted average (TWA) concentration for chlorpyrifos of 0.2mg/m³.

Australia [6]

Safe Work Australia has set an 8-hour time TWA for chlorpyrifos of 0/1mg/m³.

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2. <https://apvma.gov.au/node/50091>
3. <https://www.nationalgeographic.com/environment/2018/08/chlorpyrifos-insecticides-pesticides-epa-organophosphates/>
4. https://cdn.nufarm.com/wp-content/uploads/sites/22/2018/05/06182543/Chlorpyrifos500EC_SDS_1030_0816.pdf
5. <https://www.cdc.gov/niosh/pel88/2921-88.html>
6. <file:///C:/Users/Lauren%20Rosenberg/Downloads/draft-evaluation-report-wes-chlorpyrifos-pdf.pdf>

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Gossip

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Many BPA-free plastics are toxic. Some are worse than BPA

2020-06-25

Plastics are everywhere. They're in our clothes. They're in our furniture. They're even in our food, seeping in through all manner of bags, boxes, wrappings, liners and seals. Rip open any package and microplastic bits flood out.

Plastics helped bring about the modern era of affordable convenience. But that ease has also put our health at risk. For more than half a century, manufacturers have been making plastics stronger and longer lasting thanks to an industrial chemical called bisphenol A, or BPA. But study after study has now shown that BPA is toxic to human brains, reproductive systems and more. **BPA can cause fertility problems**, possibly **including miscarriage**, as well as **behavioral issues in children**, and can even lead to an increased **risk of heart disease** and **diabetes** in adults. These revelations forced the industry to change.

"Bisphenol A started to get a really bad reputation," says Washington State University reproductive biologist Patricia Hunt. "And as state legislatures started to ask for bans on BPA in baby products and sippy cups, the industry started to roll out replacement bisphenols."

In recent years, this surge in fresh plastics has brought consumers some small manner of comfort. The BPA-free sticker makes us feel better about the water bottles we drink from and the toys we give our children.

But Hunt is here to burst the BPA-free bubble. There are now at least 50 BPA-free alternatives, with names like bisphenol S and bisphenol F. So little is known about their use that even scientists can't really say how many are in circulation. What researchers do know is that these chemicals are structural analogs of BPA. And their similarities don't stop at their chemical structure — they also disrupt how cells function in many of the same ways and cause similar toxic effects on the human body.

"It's like a never-ending shell game," Hunt says. "There are more replacements than we can test rapidly."

What BPA Does to the Body

Some two decades ago, Hunt and her colleagues stumbled onto a BPA breakthrough while working on another project. The scientists were using lab mice to model how even subtle hormonal changes can impact a woman's ability to develop a healthy egg. Initially, their experiment

But study after study has now shown that BPA is toxic to human brains, reproductive systems and more.

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appeared to be working well, returning results on par with what they'd expected.

Then their results went haywire. "We went from normal control data one week to completely abnormal data the next," Hunt says.

Eventually, they tracked down the culprit: The janitorial staff had used a harsh cleaner on all the plastic mice cages. That damaged the plastic, allowing it to leach into the mice.

Since the 1970s, scientists had been finding troubling hints that BPA had negative health effects. But Hunt's research and subsequent work provided damning evidence that mice — and their babies — that were exposed to BPA had abnormal chromosomes.

Initially, scientists thought BPA was acting like a form of weak estrogen, the primary female sex hormone that regulates reproduction and some sexual characteristics. (Men also have estrogen, but at lower levels.) Researchers believed BPA was binding to or disrupting the same receptors used by estrogen. And it does seem like that's often what's happening.

However, Hunt says it's also now clear that the reality is far more complicated. BPA doesn't just interfere with estrogen receptors; it can also interfere with thyroid hormone receptors and androgen receptors. Androgen includes testosterone, the primary male sex hormone. (Women have testosterone, too).

Since BPA has different effects in different places in the body at different times, that makes it very hard to study. For instance, rather than being able to nail down how BPA and its alternatives behave in the ovary, researchers have only been able to specify how it acts in the ovary at specific times.

"It's really complicated, and I think there's a lot of interaction we don't completely understand," says Hunt. "The way that it induces its effects is variable. It's actually quite interesting. It's like a little chameleon of a chemical."

These complexities have allowed lingering doubts about how conclusive the science is that BPA can harm humans, not just animals. Historically, industry research has claimed the chemical is safe to use; even the federal government recognizes BPA as safe at certain levels.

But researchers have found evidence of abnormalities in the eggs of mice given less than half the amount of BPA that the Environmental Protection Agency has declared safe. And scientists have now studied a huge range

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of **health complications that have shown links to BPA exposure**. The list is staggering:

- Impaired brain function
- Impaired thyroid function
- Increased risk of obesity
- Increased risk of high blood pressure
- Increased cancer risk
- Increased erectile difficulty
- Low sperm count
- Premature birth
- Childhood behavioral issues
- And many more

Toxic BPA-Free Alternatives

Things have only gotten more complicated as scientists around the world have tried to unravel the health effects of dozens of newly introduced BPA alternatives.

Those studies have already been going on for years, and they've been building startling-yet-familiar evidence. They act as disruptors in many of the same ways as BPA; in fact, not only are many BPA-free plastic alternatives bad for you — in some cases, they're worse than BPA itself.

"We now have this whole host of bisphenols that we have to ask questions about: 'Do they all induce the same types of abnormalities? Are some better? Are some worse?' et cetera, et cetera," Hunt says.

Some of the lingering unknowns stem from current restrictions on experiments with human fetal tissue, she says. These samples are often obtained through elective abortions, and that's made them politically fraught. As a result, it's hard to study the impacts these chemicals are having at a crucial time: during development of the brain, ovary and mammary glands.

Instead, scientists have to turn to other living things as models for what's happening in humans. This work has provided compelling evidence for the same damaging effects across a range of species. But it's also led to criticisms that scientists haven't conclusively shown BPA-like chemicals are bad for humans, too.

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"When people study rodents, frequently we're told, 'Well, these are only rodents. We can't extrapolate to humans,'" Hunt says. "OK, we could go to the monkey as models. Well, monkeys are very expensive studies. We can only use a few monkeys, and that research is not very popular either, but it gets closer to humans. So we've done that for bisphenol A, and there's really compelling evidence it induces the same sort of effects."

Some studies of human fetal tissue have been done. But most studies of exposure in humans have to look for correlations. For example, scientists study pregnant mothers' urine and blood, then compare those exposure levels to the effects they see in their offspring. Together, that research has offered up strong evidence that these chemicals have harmful effects in the body.

"We see some [cause for] concern from mice to monkeys to roundworms," she says. "There's no reason that we would think that humans would be different."

How to Avoid Exposure

To Hunt, the evidence is damning enough that she avoids plastics when she can. She doesn't microwave any plastic or put plastic in her dishwasher. And she stores her food in glass.

But she says plastic food containers are actually just one way people are exposed to BPA and its alternatives. Another major culprit is "pressure-printed" paper receipts. The waxy layer of stuff on your average receipt is often made from a layer that includes BPA, as well as BPA-free alternative chemicals.

So grocery store clerks, fast food workers, retail cashiers and many others are exposed to significant doses of these chemicals every day. In a number of studies, researchers have taken blood and urine samples from cashiers before and after their shifts; the chemical levels spiked as the **toxic compounds leached into the workers' bodies.**

Hunt says she and her colleagues have been especially worried about these kinds of exposures that our "essential employees" are getting as the COVID-19 pandemic has spread around the world. In a variety of ways, these everyday exposures — and others — are putting workers at an increased risk for a host of health conditions, from asthma to diabetes. And those preexisting conditions are making COVID-19 infections worse for people on the pandemic's front lines. It's just one more way exposure to these chemicals might have a cascade of effects.

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"There's always many more [chemicals] we should be testing, and there's always many, many ways we should look at them," Hunt says. "It's looking like exposure to these types of chemicals is actually going to fundamentally change our body."

discovermagazine.com, 25 June 2020

<https://www.discovermagazine.com>

Plastic 'has entered' Antarctic terrestrial food chain

2020-06-25

Paris: Scientists have found bits of polystyrene in the guts of tiny, soil-dwelling organisms in the Antarctic, raising concern that microplastics pollution has already "deeply" entered the world's most remote land-based food systems.

While the infiltration of microplastics throughout the oceans is well-known, researchers said their findings provided the first evidence of contamination in the Antarctic terrestrial food chain.

"Plastics have therefore entered even some of the most remote soil food webs on the planet, with potential risks for the whole biota and ecosystems," said authors of the study, published Wednesday in the journal *Biology Letters*.

They warned this could also be a new stressor for fragile polar ecosystems already facing threats from climate change.

Scientists focused on collembolan *Cryptopygus antarcticus* -- small organisms commonly known as springtails that can jump in a similar way to fleas, although they are not classed as insects.

They are among the few organisms adapted to survive in the harsh Antarctic conditions and are "often the dominant species" in the few areas of the region not covered by ice, the study said. They mainly eat micro-algae and lichens.

Researchers, led by scientists from Italy's University of Siena, collected the creatures from a chunk of polystyrene foam covered in a green layer of micro-algae, moss and lichens on King George Island in the South Shetland Islands.

Human activity in the area including scientific research stations, airport and military facilities, and tourism have acted to make it "one of the most contaminated regions of Antarctica".

While the infiltration of microplastics throughout the oceans is well-known, researchers said their findings provided the first evidence of contamination in the Antarctic terrestrial food chain.

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By examining the collembola using an imaging technique with infrared and comparing the images to fragments of the polystyrene, the researchers “unequivocally” detected traces of the plastic in their guts.

The authors said they believed the creatures ate the plastic fragments while grazing on their usual food.

Plastic pollution ‘ubiquitous’

Elisa Bergami of the University of Siena said the study showed that plastic pollution is “ubiquitous” and had reached even remote polar regions.

“Cryptopygus antarcticus has a key role in the simple Antarctic terrestrial food webs,” she said.

“The implications of plastic ingestion by this species include the potential redistribution of microplastics through the soil profile and transfer to their common predators, the moss mites.”

Bergami said contamination on land had drawn less attention than ocean pollution.

She called for more research into the potential toxicity of exposure to plastic, which is associated with pathogens, contaminants and antibiotic-resistance.

Researchers also raised concerns about styrofoam, because its porous structure could encourage the formation of moss and other growth, thereby attracting organisms.

In separate research, two different groups of scientists from China and the US have reported discovering that manmade mercury pollution has reached the bottom of the deepest part of the ocean, the Marianas Trench in the Pacific.

The studies, reported at the Goldschmidt Geochemistry conference this week, found both manmade and natural methylmercury -- a toxic form of mercury -- in fish and crustaceans in the trench.

Mercury, which can become concentrated in animals towards the top of the marine food chain, is poisonous at high levels and can harm a developing foetus.

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It can reach the oceans as a result of human activities like mining, as well as burning coal and petroleum.

thepeninsulaqatar, 25 June 2020

<https://www.thepeninsulaqatar.com>

How Hong Kong cleaned up its toxic harbour

2020-06-30

From the 1970s and well into the early 2000s, Hong Kong’s Victoria Harbour reeked. Unprecedented growth might have turned the territory – whose name ironically translates into English as “Fragrant Harbour” – into an economic tiger, but a growing population, as well as industrial and agricultural expansion, transformed its harbour into a cesspool.

It was filled with human excrement and effluent from farms that raised pigs and chickens, as well as untreated water loaded with chemicals and metals from textile and metal-plating industries located in the New Territories. **Tests would show that the water had high levels of coliform bacteria, including E. coli**, an indication of pollution due to faecal contamination, which made the water a health hazard.

In 1989, the government revealed in a policy paper that **of the two million tonnes of sewage and industrial wastewater generated by Hong Kong every day**, just 10% received some kind of biological treatment; 40% received partial treatment and was released through submarine pipes extending tens of metres beyond the seawall. The remaining 50% went **straight into the sea, close to shore, with no treatment of any kind**. Many areas in the territory were also developed without proper sewage mains, and four in five sewage treatment facilities didn’t meet required standards.

Virendra Anand lived on a boat in the Causeway Bay Typhoon Shelter from 1991 to 1993. “Back then, those of us who had boats never needed anti-fouling, which would normally be needed every two to three years to prevent barnacles from sticking to the hull,” says Anand, whose company was involved in what would become the Harbour Area Treatment Scheme. “The joke was that nothing stuck to the boat because **we were floating on sewage**.”

The 1989 paper would eventually form the basis for an ambitious, three-stage system where sewage would be collected from different parts of Hong Kong and sent back to a proposed treatment plant to be built on Stonecutter’s Island, on the western side of Victoria Harbour.

China claimed the disposal scheme, due to cost \$1.55bn at the time, was too expensive and would have a negative impact on the marine environment in the Pearl River Delta.

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But it was a controversial project. China claimed the disposal scheme, due to cost \$1.55bn at the time, was too expensive and would have a negative impact on the marine environment in the Pearl River Delta. Some local environmentalists said the treatment didn't go far enough, and that it was dangerous to send partially treated effluent back into the sea. But China's opposition also triggered concern from conservationists like Joanna Ruxton, who were worried that the project would stall after the 1997 handover, because the perception at the time was that China would not prioritise environmental protection. Despite political opposition, construction of the disposal scheme tunnel system began in 1995, although it encountered challenging geological conditions – **the tunnels were to be built into hard granitic and volcanic rocks**. The project was suspended in December 1996 because **contractors were struggling to carry out the work**. Critics accused Hong Kong's Drainage Services Department of carrying out **inadequate site surveys that failed to account for pre-existing underground structures**. By that time, researchers studying pollution in Victoria Harbour noted that bacterial levels in the water were similar to those found in raw sewage.

After this false start, the project restarted in 1997, but the formidable challenges it faced had not gone away. The tunnels needed to avoid the labyrinth of Hong Kong's Mass Transit Railway system, cross-harbour tunnels, building foundations and the underground network of gas pipes, telecommunications wiring and electrics. As a result, the sewage tunnels would have to be built between 70 to 160m below sea level, which put them at risk of groundwater flooding. In order to get around these challenges, contractors made use of a "drill and blast" method, while building structures to keep fault zones and fractured ground stable at the same time. In all, contractors made use of about 2,000 tonnes of explosives to get the job done.

When the initial tunnelling was completed in 2001, Hong Kong had a 23.6km network of interconnected tunnels within which a sewage conveyance system could be built, and a treatment plant at Stonecutter's Island ready for action. It brought immediate relief to the pungent Victoria Harbour. The upgrade of treatment works, and the vast network of underground sewer pipes removed 70% of organic pollutants, and 80% of suspended solids. The first stage of the project saw a 50% reduction in E. coli. The start of the second stage, which was completed in December 2015, saw the construction of an additional 21km of underground pipes, linking up the remaining sections of the territory to the sewage treatment facility. In all, the project added a critical, 45km long, 160m deep, sewage

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conveyance system to the territory's existing sewage system. **Today it channels 93% of the territory's effluent to Stonecutter's Island for treatment.**

The average E. coli count in Victoria Harbour in the period 2016-2018 was 92.5% lower than it was between 1997-2001, notes Kenneth Leung Mei-Yee, a professor at the Swire Institute of Marine Science at the University of Hong Kong. That change allowed swimmer Edie Hu to hit the water in 2018, to become the first Asian woman to complete a 45km swim around Hong Kong island for charity. Hu didn't report any ill effects from her considerable time the water.

But, so far, the project is only half done. **The Hong Kong government decided to shelve the next phase of the project in 2017**, which had called for the building of a secondary biological treatment facility. Instead it is looking **to deal with pollutants that come from storm drains and illegal discharge, which flow straight into Victoria Harbour.**

"Plenty of sea-borne pollution is triggered by heavy rains that washes everything out of the urban drainage system," says Stephen Davis, marine historian at the University of Hong Kong. "So immediately after a period of heavy rain, the sea becomes a horror story. Rainwater washes out every nullah or open drain on every hillside, and these are full of plastic bags and sweet wrappers, so all the refuse is washed out onto the surface of the sea or just under it." Aside from single-use plastics, there is also marine refuse, oil spills from ships that go to and from the container terminal, decaying algae, as well as sediments found near drainage outlets and in the seabed.

Then there are also the challenges posed by heavily populated regions up the Pearl River Delta. Experts like Davis and Leung are wary of what the tides bring. "When the high tide comes, water from the eastern side of Hong Kong with clean water comes into the harbour. But during the low tide, discharge from the Pearl River Delta can make its way into the harbour, having a direct impact on the harbour's water quality," Leung said.

Christine Loh, former undersecretary for the environment, believes it is possible for Hong Kong to keep its waters clean, but the territory needs to look at the bigger picture. "Victoria Harbour, like any body of water, has to be seen in context. All activities can cause pollution and environmental disruptions. Local pollution can be better controlled but disruptions that are caused through physical changes, such as reclamation, must also be looked at," says Loh. "Reclamation can cause changes in water flow, which can in turn lead to dead zones."

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Loh also stressed that Hong Kong can't do this alone. "China's policies relating to the ocean economy need to be taken on board by Hong Kong," she says, so that the way coastal infrastructure is planned makes sense across the region.

It may have taken decades, and billions of pounds to get this far, but the results of the intricate tunnelling work to create the drainage system are palpable. In place of water little cleaner than raw sewage, the waters around Hong Kong now somewhere that the brave can swim, at least when the tide is right.

bbc.com, 30 June 2020

<https://bbc.com>

With much of the world's economy slowed down, green energy powers on

2020-06-30

After a two-hour boat trip from Lowestoft, a seaside town on the east coast of England, giant wind mills more than 500 feet high loomed out of the mist like enormous sea creatures. High atop the towers, technicians in helmets and red-and-black protective suits were visible, fine-tuning the machines and hooking them up to the British power system.

Britain has been under various stages of lockdown since March, but work on this wind farm, called East Anglia One, has charged ahead.

But early on, the companies behind the 2.5 billion pound (\$3.1 billion) project weren't so sure.

As the coronavirus was gathering momentum across Europe, managers called a one-day halt in late March to consider whether pushing forward made sense. New health and safety measures would inevitably drain resources.

"We had to do a check and say 'OK, should the project continue?' and we asked ourselves with a very open mind," said Charlie Jordan, the project director for Iberdrola, the Spanish utility developing the project.

The answer was "yes." Work resumed the next day, and hasn't stopped.

The fallout from the coronavirus pandemic has many businesses reeling, and the oil and gas industry in particular has been rocked by plummeting prices that have forced it to drastically cut production and lay off workers.

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But producers of clean energy are pushing hard to get their projects up and running. They want to start making money on their investments as soon as possible, and while demand for electricity has been reduced by the impact of the virus, renewable power tends to win out over polluting sources in electricity systems because of low costs and favorable regulatory rules.

While crews fixed the huge turbines to the seabed off the English coast in April, Iberdrola began producing power from what it says is Europe's largest solar energy facility, in western Spain.

Mr. Jordan, the offshore project manager, said that he and his colleagues figured that they could take steps to keep risks under control. Among other things, contractors rented holiday cabins and reached agreements with hotels near Lowestoft, the operations base, so that they could house some of the offshore workers there and keep them isolated. Workers were taken out by boats to the wind farm for 12-hour day and night shifts.

So far, no one working on the project has become ill with the coronavirus, according to Mr. Jordan.

All of the 102 turbines are now installed in an area about 25 miles off the coastline. The nearly 250-foot blades on top of these monsters can spin out enough power to supply around 600,000 homes, according to the company.

Demand for the equipment for these projects is putting pressure on makers of gear to keep their factories churning. Vestas Wind Systems, for instance, is striving to keep a global network that includes plants in Colorado, China, Denmark and elsewhere largely open to meet a record first-quarter order book of 34.1 billion euros for its giant electric power-generating windmills and services.

"We started out differently, saying 'Let's not use the excuse of Covid-19,'" said Henrik Andersen, the chief executive of Vestas, which is based in Denmark.

Vestas, too, points to a variety of measures it has taken to keep workers safe. At its factory in Denmark that makes nacelles, the chambers at the top of turbines, safety measures are visible, especially in the canteen. The meals now come on prepared plates rather than buffet style, and employees eat in shifts to reduce crowding. People sit diagonally across from one another at tables.

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"It is strange having to keep distance to your co-workers when you are so used to being close," said Julie Noesgaard, who packages parts for shipment.

The pandemic is certainly throwing up obstacles for these companies. Vestas said that in the first quarter matters like delays in obtaining components and changes in work procedures added €10 million or \$10.8 million in costs, contributing to an €80 million loss. The company said it was suspending guidance for the year.

Markus Tacke, who until recently served as chief executive of Siemens Gamesa Renewable Energy, which made the East Anglia turbines, said during a call with reporters that the dire health situation in Italy and travel restrictions in India this year prevented him from signing two contracts, though he assumed the deals would be concluded later.

The green energy industry has bad memories of the financial crisis of 2008 and 2009, which proved to be a big setback. Vestas was forced into closing or selling a dozen factories and shedding a third of its work force as orders fell. Other manufacturers were similarly rocked.

Analysts say that while the renewables industry will not be immune to the effects of the pandemic, it is likely to fare better this time around.

"The outlook for renewables looks really quite resilient, despite all the Covid restrictions," said Sam Arie, a utilities analyst at UBS, an investment bank. "We have seen a few companies with minor interruptions," he added. "But relative to other sectors the impacts here have been very limited."

The main reasons for the difference: Businesses have also consolidated, creating stronger players. Siemens Gamesa, for instance, was formed in 2017 through the merger of the wind interests of the German industrial giant Siemens with those of Gamesa, a Spanish company.

The industry has also continued to bring down costs. The turbines at East Anglia One are 15 times as powerful as those installed in the first offshore wind farms almost 30 years ago, and so they produce much more revenue per unit. In the United States wind power often ranks as the least expensive source of electricity, according to Supriya Subramanian, a UBS analyst.

Industry executives argue that renewable energy is now mainstream, not a fringe player, and this gives them a stronger chance of emerging from this crisis in better shape. When looking at options for electric power, a vital force for all economies, governments and other customers often favor

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green energy options not only to reduce emissions blamed for climate change, but also because they are often cheaper. Demand for clean power is also expected to grow as electricity powers more manufacturing and transportation.

Low operating costs — wind and sunshine are free, after all — and prioritizing by some governments are key reasons that the International Energy Agency forecasts that these and other renewables will be the only energy sources that grow this year. The use of coal will take the steepest dive since World War II, the agency forecasts, contributing to an 8 percent drop in CO2 emissions.

Emissions also fell during the financial crisis, but bounced back. The question is whether the pattern will repeat itself. There is reason to calculate that the world economy that emerges from a deep recession could differ in terms of how it uses energy, the main source of emissions, from the pre-pandemic version. Working at home may prove to be a lasting habit for many, cutting down the use of gasoline-burning cars for commuting. And international travel may have lost its appeal for years.

"People are going to stay home or closer to home" until there is a vaccine for the virus, said Jan Freitag, a vice president at the travel consultants STR.

Faced with reduced demand for their products and rock-bottom prices, oil and gas companies are cutting back investment by about a quarter, or \$110 billion, according to Rystad Energy, a consulting firm. Delays on investment decisions may favor wind and solar power because their costs are falling.

"The longer you wait, the more likely the decision is for renewables," said Jarand Rystad, chief executive of Rystad Energy, a consulting firm.

Environmentalists say that the public has noticed the beneficial side effects of the pandemic and will want them to continue.

"People have experienced clear blue skies," said Fred Krupp, president of the Environmental Defense Fund, "and want to find ways to keep them as we put people back to work."

[nytimes.com](https://www.nytimes.com), 30 June 2020

<https://www.nytimes.com>

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Bayer forges ahead with new crops resistant to 5 herbicides

2020-07-01

Over the past few years, Bayer (which now owns Monsanto) has repeatedly lost in court to those who have claimed its Roundup herbicide is responsible for their cancer diagnoses. Things appeared to get worse for the agrichemical company last week, when it agreed to pay \$10 billion to settle tens of thousands of similar lawsuits.

At the same time, the company paid \$400 million to settle claims brought by farmers who claimed their crops were destroyed when dicamba, the active ingredient in Bayer's XtendiMax herbicide, drifted onto their fields. That was after a federal court reversed the U.S. Environmental Protection Agency's (EPA) approval of dicamba based on extensive evidence of widespread harm it caused to farmers' crops. (U.S. Secretary of Agriculture Sonny Perdue then urged the EPA to allow the continued use of already purchased dicamba products.)

Public health advocates and environmental groups have celebrated these news stories as victories in their crusade to reduce the widespread use of genetic engineering (GE) and hazardous pesticides. Meanwhile, it appears that Bayer has barely registered them as speed bumps, as the company forges ahead with new products that are likely to increase the use of the very same—and additional—herbicides.

"Bayer is committed to and stands fully behind our Roundup and XtendiMax herbicides. We are proud of our role in bringing solutions to help growers safely, successfully, and sustainably protect their crops from weeds," a Bayer spokesperson told Civil Eats.

Top of Form

Bottom of Form

And in fact, the U.S. Department of Agriculture (USDA) is currently considering the approval of a genetically engineered variety of corn developed by Bayer that would be resistant to at least five herbicides at once—including glyphosate (the active ingredient in Roundup) and dicamba.

If all goes according to plan, the company expects to launch the corn in the U.S. "mid-to-late this decade." Some groups hope to disrupt that trajectory.

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"The fact that Bayer is now petitioning for this new GE maize shows that it has certainly not shifted the corporation's intentions with respect to how to get on the right side of history . . . or to back off from a production system that is going to lock farmers into a chemical-intensive business model," said Marcia Ishii-Eiteman, a senior scientist at the Pesticide Action Network (PAN), which is urging its members to comment on the USDA petition for the seed's approval. "They are just pushing forward."

Chemical-Resistant Corn

The new variety of corn, MON 87429, would be bred with other hybrid varieties to produce seeds that, when planted, will grow despite being sprayed by glyphosate, dicamba, 2,4-D, quizalofop, and glufosinate.

Bill Freese, a science policy analyst at the Center for Food Safety, said that while a crop that is resistant to five herbicides is "certainly a record," it's not a surprising next step for the industry, which has been increasingly introducing multi-herbicide-resistant varieties.

Corteva's Enlist corn is resistant to both glyphosate and 2,4-D, while Bayer's Xtend system includes soybean and cotton varieties resistant to glyphosate and dicamba. Its newest XtendFlex soybeans are resistant to glyphosate, dicamba, and glufosinate.

Most herbicides only kill certain classes of weeds; Roundup is designed to kill nearly everything. But after decades of intensive, widespread use, many weeds have developed resistance to glyphosate, leaving farmers who have come to rely on Roundup in need of additional chemicals for weed management.

"It's the logical progression, to make everything resistant to most major classes of herbicides," Freese said. "What's important, in our view, is that extremely troubling trend in industrial agriculture, which leads to much greater, more intensive herbicide use and more weeds resistant to multiple herbicides."

Bayer submitted a petition requesting "nonregulated" status for MON 87429 last year, which essentially means it wants to move the crop out of field trials and into commercial use. If the USDA grants that status, Bayer will be able to plant and breed the crop free of regulation. In May, the USDA posted the company's petition in the federal register, where it is open for public comment until July 7. After that, the agency will conduct an assessment of the petition and determine whether it plans to grant

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nonregulated status. When that assessment is complete, USDA will open up another public comment period.

Based on recent history, experts say the USDA is likely on track to approve the variety. (The agency also recently further relaxed its rules related to GE regulation, but this seed is being evaluated under the old rules.) And because the plants themselves won't produce pesticides (unlike GE crops such as BT corn, which produce insecticides within the plant), the seed does not have to be approved by the EPA.

Effects of Modifying Crops for Herbicide Use

The EPA does regulate the herbicides that will then be used on the new corn variety, but it already considers these chemicals to be safe and allows their use.

For example, an EPA assessment released in January concluded that glyphosate is not a human carcinogen, although the International Agency for Research on Cancer has linked it to cancer and calls it a probable carcinogen. Meanwhile, numerous court juries have sided with scientists who presented evidence showing glyphosate is associated with non-Hodgkin's lymphoma. (Part of Bayer's recent settlement will be used to set up an independent expert panel to definitively tackle whether the chemical causes cancer and, if so, to determine what level of exposure is dangerous.)

In addition to destroying nearby farmers' crops, dicamba has destroyed tens of millions of trees across the country, devastating orchards and ecosystems. 2,4-D is an older herbicide that has also been linked to serious health risks including non-Hodgkin's lymphoma and thyroid disorders; its effects on ecosystems and wildlife were documented as early as the 1960s, in Rachel Carson's *Silent Spring*.

Quizalofop, an herbicide that kills grassy weeds and is currently used on some wheat, has been linked to reproductive cancers and liver toxicity, but is considered safe at current use levels by the EPA. More research on glufosinate's health and environmental effects is needed; researchers have determined it is not carcinogenic, but the European Union classifies it with a warning for organ toxicity and negative effects on fertility and fetal development.

One of the biggest concerns around introducing new herbicide-resistant crops is that they will likely lead to a significantly increase in the volume of herbicides farmers apply. One analysis found that since Roundup-

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ready crops were introduced in the mid 1990s, global use of glyphosate has increased 15-fold. In the U.S., Bayer's dicamba-resistant Xtend system skyrocketed in popularity after 2016; between 2016 and 2017, estimated dicamba use doubled, from less than 10 million pounds to close to 20 million.

Another concern is a lack of data on the effects of using so many different herbicides on the same plants, landscape, and food, and what exposure to that combination might mean for farmers and farmworkers.

"We don't know what the synergistic effects of these cocktails of pesticides will be when applied," Ishii-Eiteman said, referring to the potential for unexpected effects when two chemicals interact. And yet, state and federal regulators generally focus on the effects of each chemical used on its own. There is some evidence that pesticides can have cumulative effects, in terms of a build-up of exposures, but the impact is very hard to measure.

Bayer's spokesperson said that the crop's intention would be to give farmers the flexibility to choose between herbicides, and that the company did not expect farmers to apply all five herbicides to the same crop.

Advocates have also expressed concerns about increased herbicide use exacerbating the current problem with herbicide-resistant weeds. Because Roundup can be applied liberally to destroy almost any weed, its widespread use has reduced its efficacy. According to the USDA, 14 glyphosate-resistant weeds currently plague U.S. cropland, and one 2013 study found 50 percent of farms surveyed were dealing with these powerful plants.

Bayer acknowledges the issue in its petition, writing that, "MON 87429 maize will offer growers multiple choices for effective weed management, including tough-to-control and herbicide-resistant broadleaf and grass weeds" and specifically pointing out that "dicamba, glufosinate, and 2,4-D individually or in certain combinations provide control of" certain glyphosate-resistant weeds."

Their scientists and other researchers and organizations, including at the USDA, point to the fact that combining or alternating herbicides has been found to reduce the development of herbicide resistance compared to relying on single herbicides.

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However, that's the logic that Bayer applied when adding dicamba to glyphosate in its Xtend system, and the scaled-up planting of those crops created dicamba-resistant palmer amaranth in just a few years.

Rob Faux operates a diversified organic farm that's surrounded by commodity fields in Northeast Iowa, and he said he doesn't buy into the company's stated goal of providing farmers with more options. "In reality, they're trying to reduce the choices farmers have," Faux, who also runs Iowa communications for PAN, told Civil Eats. "They're not trying to provide more tools for the farmer. They're just trying to capture market. And unfortunately, some of that market they'll capture is by causing people to plant these seeds defensively."

Faux was referring to farmers he knows in Iowa who have planted dicamba-resistant seeds to preemptively protect their crops from plumes of drift that float through the air from neighboring farms, even if they did not plan on using the herbicide themselves.

Now that a federal court has recognized the issue of drift as significant enough to ban the herbicide, the future of dicamba is uncertain. On June 16, Bayer announced it was scrapping a billion-dollar project to produce the herbicide in the U.S., but said it was unrelated to the court decision. And many other signs point to the company moving full-speed ahead. In addition to MON 87429, a Bayer spokesperson told Politico this week that the company also has "several dicamba formulations in our pipeline."

civileats.com, 1 July 2020

<https://www.civileats.com>

This shrimp has some of the fastest eyes on the planet

2020-06-23

Though not much bigger than a wooden match stick, snapping shrimp (*Alpheus heterochaelis*, pictured) are already famous for their loud, quick closing claws, the sound of which stuns their prey and rivals. Now, researchers have discovered these marine crustaceans have the eyesight to match this speed.

In the new study, scientists stuck a thin conducting wire into the eye of a chilled, live shrimp and recorded electrical impulses from the eye in response to flickering light. The crustaceans refresh their view 160 times a second, the team reports today in *Biology Letters*.

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That's one of the highest refresh rates of any animal on Earth. Pigeons come close, being able to sample their field of view 143 times per second, whereas humans top out at a relatively measly 60 times a second. Only some day-flying insects beat the snapping shrimp, the researchers report. As a result, what people—perhaps even Superman—and all other vertebrates see as a blur, the shrimp detects as discrete images moving across its field of vision.

Until a few years ago, most researchers assumed snapping shrimp didn't see very well because they have a hard hood called a carapace that extends over their eyes. Although the hood seems transparent, with some coloration, it wasn't clear how well it transmitted light. But it appears to be no impediment to the shrimp detecting fast moving prey or even predators whipping by. This might be important because the shrimp tend to live in cloudy water, so they don't have much notice when another critter is approaching them.

sciencemag.org, 23 June 2020

<https://www.sciencemag.org>

New hydrogel could work as well as cartilage in knee replacements

2020-06-28

Cartilage plays a crucial role in your knees, but unfortunately once it's damaged or worn out it's hard to repair. A replacement is often required, but these aren't as good as the real thing. Now, researchers at Duke University have created a new hydrogel that's strong enough to withstand forces as well as natural cartilage.

The knee is a major stress point of the human body, so the cartilage there has to be strong enough to support a person's weight, but soft enough to cushion against the intense forces of every step. But when this useful stuff is injured, or wears out after decades of constant use, it doesn't heal very well. Sometimes the only thing left to do is a total knee replacement, but these are never as good as the original equipment.

Hydrogels have long been studied for their potential as a cartilage replacement material. These are a versatile class of materials that, as the name suggests, are a gel mostly made of water. They're increasingly finding medical use for things like helping wounds heal, stemming bleeding, and even stimulating tissue regrowth.

Now, researchers at Duke University have created a new hydrogel that's strong enough to withstand forces as well as natural cartilage.

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Promising as they might seem as cartilage replacements in knees, hydrogels have mostly been too weak to support so much weight. But now, the Duke researchers claim to have created a new version of the material that has the mechanical properties of cartilage.

The new hydrogel is made up of several meshes of polymer strands, woven together. One of these networks is comprised of stretchy strands, while the second is more rigid and has strands with a negative charge. The third mesh contains cellulose fibers to reinforce the structure.

All together, the three networks grant the hydrogel the ability to snap back to its original shape after being stretched or squeezed. The cellulose fibers help for the first point, since they resist being pulled and keep the material from tearing apart. The rigid polymer network, meanwhile, pushes back against squeezing forces, since the negatively-charged strands repel each other.

“Only this combination of all three components is both flexible and stiff and therefore strong,” says Feichen Yang, co-author of the study.

In tests, the team demonstrated the abilities of the new hydrogel. A coin-sized disk of the stuff was able to hold up a 100-lb (45-kg) kettlebell weight without tearing or losing its shape. It was stretched 100,000 times, and found to hold up just as well as a porous titanium currently used for bone implants. This was even stronger than the team expected.

And finally, it was also rubbed against a sample of natural cartilage a million times, and was found to be as wear-resistant as the real stuff, and four times more resistant than existing synthetic cartilage.

The team says that the new hydrogel shows promise for use as a replacement for damaged cartilage in knees, but such clinical uses will still be a few years away at the earliest. In the meantime, the researchers next plan to design an implant that can be tested in sheep.

newsatlas.com, 28 June 2020

<https://www.newsatlas.com>

Record-setting Saharan dust plume is exiting U.S., while second, gentler pulse appears

2020-06-29

After touring the southern United States for more than a week, the intrepid plume of African dust that has brought haze and poor air quality

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along the Gulf Coast is finally withdrawing over the Atlantic. The extreme episode has contributed to record heat in South Florida, while draping a dull gray veil over a number of islands from the Caribbean to the Lesser Antilles. Experts heralded the outbreak as one the most prolific measured in the modern era. But more is on the way.

On the heels of the first wave of dust is a second, albeit tamer, cloud of gritty sand again drifting west across the ocean. Its sights are set on the western Gulf of Mexico, the aerosols affecting areas that already experienced dust last week. Air quality and visibility could again decline as the dust cloud closes in.

The dust now

Satellite imagery on Monday afternoon revealed a swath of dust extending from the Bay of Campeche and the Yucatán Peninsula eastward through the Caribbean, with the greatest concentrations of dust particulates west of the Leeward Islands.

Computer models suggested an ebb of that cloud would overspread parts of eastern Mexico, coastal Texas and Louisiana between Tuesday and Wednesday before disintegrating late in the week.

The dust should not be as widespread or as thick as it was during much of last week or over the weekend, though a noticeable tinge to the sky should be evident in the areas affected.

An event to be remembered

Last week's plume was arguably one of the most, if not the most, extreme events on record from a dust-transport standpoint. Joe Prospero, an atmospheric scientist and professor emeritus at the University of Miami, said the episode will be studied for years to come.

“This event ... was the largest event that we have ever seen over 50 years that we have been in Barbados,” said Prospero, who has spearheaded efforts in the Leeward Islands to study Saharan dust. “It’s pretty clear this was a phenomenal event. We know that the aerosol concentrations were the highest we’ve ever measured by a substantial amount.”

He also referenced “optical depth,” a vertically integrated metric measuring how densely the atmosphere is clouded over with a type of aerosol.

“That was higher than everything we’ve seen in 25 years,” Prospero noted. “It was really dramatic.”

On the heels of the first wave of dust is a second, albeit tamer, cloud of gritty sand again drifting west across the ocean.

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A lidar device based at the University of Miami suggested that most of the dust was present between one and 2.5 miles above the ground.

The data he reviewed also indicated a surprising homogeneity, or uniformness, in the size of the sand particles caught up in the air — indicating that most of the dust came from a rather localized area in Africa.

“I’ve never seen anything like that,” Prospero said. “It raises interesting questions about what the sources [of the dust] are, and about the mechanisms for lifting it up.”

What satellite reveals about the approaching dust

Prospero also explained that the dust cloud was strong enough to eradicate cloud cover over an enormous strip of the Atlantic, its parent Saharan Air Layer warm enough to preclude any air pockets near the surface from rising.

“Normally, when you see a Saharan dust outbreak, you have little fractals of cumulus,” Prospero said. “This was unusually cloud-free.”

The same technique of evaluating satellite imagery lends credence to this next event being less significant.

“The second pulse that [is coming] through has a bit more cloud in it,” Prospero noted. “It’s not going to last as long as the other one. But it’s modifying the whole atmosphere up to 12[,000] or 14,000 feet. Sometimes, it’s up to 18[,000] or 20,000 feet off the coast of Africa.”

Impacts

Last week’s dust plume brought elevated unhealthy air-quality indexes to major metropolitan cities, such as Houston, Galveston and Brownsville in Texas, New Orleans and even Tallahassee. Previously, it had reduced visibility down to as little as three miles in the U.S. Virgin Islands.

Air-quality indexes from dusty particulate matter won’t be as bad with the trailing cloud of dust, but there’s a chance that additional air-quality concerns could arise, particularly in South Texas, as the Saharan Air Layer spreads overhead. The warm air at the mid-levels “caps” the atmosphere, trapping pollutants near the surface.

That means a 24- to 36-hour period of pollution buildup may be possible in some areas where weak winds and little venting could help a few areas climb into the “moderate” category for air quality. A few pockets of air unhealthy for sensitive groups are possible.

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Moreover, the hot temperatures — exacerbated by the paltry cloud cover eroded by the Saharan Air Layer — will help brew unhealthy levels of near-surface ozone, a pollutant.

“NASA GEOS-5 modeling indicates that another round of dust is also expected to reach the region by Wednesday morning, with haziest conditions from the dust possible Wednesday and Thursday,” wrote the National Weather Service in Corpus Christi, Tex.

Temperatures near 100 degrees were possible along the South Texas Coastal Plain on Wednesday, the National Weather Service in Brownsville, Tex., advertising that the dust “will contribute to lower air quality.”

The Texas Commission on Environmental Quality is specifically calling for poor air quality over Brownsville and Corpus Christi on Wednesday.

“Overall, depending on the intensity and coverage of the arriving African dust cloud, the daily [particulate matter concentration] is forecast to possibly reach the lower end of the ‘Unhealthy for Sensitive Groups’ range in parts of the Brownsville-McAllen and Corpus Christi areas,” the commission wrote.

Hot temperatures and potentially hazardous heat index values are possible, too, the Saharan Air Layer minimizing the development of afternoon clouds and rain showers that typically cool back coastal areas in the afternoon.

The dust finally looks to diminish by late in the week, but there is a chance that additional waves of dust could propagate across the Atlantic into early July.

washingtonpost.com, 29 June 2020

<https://www.washingtonpost.com>

Deep red light reboots aging retinas like “recharging a battery”

2020-06-29

As our bodies age we can expect different components to deteriorate in performance, however, not all do so at the same pace. The retinas are one example of a part that ages sooner than most, but a new study has demonstrated how a form of deep red light therapy can help arrest this slide. Hitting the eyeball with just the right wavelength of light has been

Hitting the eyeball with just the right wavelength of light has been found to “recharge the energy system” and bring significant improvements to vision in those over 40.

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found to “recharge the energy system” and bring significant improvements to vision in those over 40.

The study conducted at University College London (UCL) looked at the potential for manipulating the performance of mitochondria, which are often referred to as the powerhouses of cells. Like they do in cells throughout the body in the body, mitochondria act as the energy factory of retinal cells by producing the energy-rich molecule, adenosine triphosphate (ATP).

The retina’s photoreceptor cells have particularly high energy needs, and are therefore where a high density of mitochondria can be found. This contributes to the disproportionate rate of age-related decline in the eyes, which begins to accelerate at around 40 years and causes a significant decline in photoreceptor function.

“As you age your visual system declines significantly, particularly once over 40,” says lead author, Glen Jeffery. “Your retinal sensitivity and your color vision are both gradually undermined, and with an aging population, this is an increasingly important issue. To try to stem or reverse this decline, we sought to reboot the retina’s aging cells with short bursts of longwave light.”

The UCL researchers had previously conducted experiments in which they found that exposing the eyes of mice, bumblebees and fruit flies to 670-nanometer deep red light resulted in significant improvements to their vision.

“Mitochondria have specific light absorbance characteristics influencing their performance: longer wavelengths spanning 650 to 1000 nanometers are absorbed and improve mitochondrial performance to increase energy production,” says Professor Jeffery.

Next, the researchers turned their attention to human subjects. This round of experiments involved 24 healthy participants between the ages of 28 and 72, who underwent examinations at the outset of the study. This meant testing the sensitivity of the retina’s rods, which handle peripheral vision and low-light scenarios, and its cones, which mediate color vision.

All of the subjects were given a small LED torch that emits a deep red 670-nanometer beam, and were asked to look into it for three minutes a day across a two-week period. Follow-up testing revealed that the therapy had no impact on the younger subjects, but brought significant benefits for those 40 and over.

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The ability to detect colors improved by as much as 20 percent in some of those subjects, with the most significant gains observed in the blue part of the spectrum that is most susceptible to age-related decline. Rod sensitivity was also significantly improved in those 40 and over, albeit not by quite as much.

“Our study shows that it is possible to significantly improve vision that has declined in aged individuals using simple brief exposures to light wavelengths that recharge the energy system that has declined in the retina cells, rather like re-charging a battery,” says Jeffery. “The technology is simple and very safe, using a deep red light of a specific wavelength, that is absorbed by mitochondria in the retina that supply energy for cellular function. Our devices cost about £12 (US\$14) to make, so the technology is highly accessible to members of the public.”

newsatlas.com, 29 June 2020

<https://www.newsatlas.com>

Scientists pin blame for some coronavirus deaths on air pollution, PFAS, and other chemicals

2020-06-27

Almost six months into the coronavirus pandemic, it’s already clear that environmental pollution is responsible for some portion of the hundreds of thousands of Covid-19 deaths around the world. Now scientists are trying to pinpoint how exactly industrial chemicals make people more susceptible to the coronavirus and how much of the blame for the devastation wrought by the new coronavirus should be laid at the feet of the industry that produces those chemicals.

The link between Covid-19 and air pollution is particularly strong.

A study set to publish in July linked six air pollutants in 120 Chinese cities with cases of the viral disease. Researchers in Italy have also shown that long-term exposure to air pollution is “significantly correlated with cases of Covid-19” in up to 71 provinces in that country. And a study that used data from California, set to publish in Environmental Research in August, showed that the air pollutants PM2.5, PM 10, nitrogen dioxide, carbon monoxide, and sulfur dioxide were associated with coronavirus infections. The authors of that study concluded that reducing exposure to these pollutants “will contribute to defeating COVID-19.”

Scientists have even managed to measure the precise harm that a single microgram/cubic meter increase in air pollution has on a population,

The link between Covid-19 and air pollution is particularly strong.

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which, according to [researchers](#) from the Harvard T.H. Chan School of Public Health, is “an 8% increase in mortality from COVID-19.”

While alarming, these findings aren’t surprising, according to Linda Birnbaum, the former director of the National Institutes for Environmental Health Sciences and the National Toxicology Program, who stepped down last year. “Everything in our health is determined by our environment,” she said.

In addition to air pollutants, Birnbaum pointed to the potential for endocrine-disrupting chemicals to make people more vulnerable to Covid-19. Among them are BPA and its replacements; phthalates, which are found in makeup, nail polish, and plastics, particularly food packaging; and [PFAS](#), a class of industrial contaminants most famously used to make [Teflon](#) and other nonstick products.

Exposure to even very small amounts of these chemicals has been linked with conditions that have been shown to make Covid-19 worse. Phthalates are associated with damage to lungs and [obesity](#), as well as to [diabetes](#), the second most common underlying condition in people who die of Covid-19, according to the Centers for Disease Control and Prevention. [BPA](#), which is often added to food packaging and drink bottles, is also linked to obesity, as well as asthma and diabetes.

PFAS, which also interferes with the functioning of the endocrine system, has been shown to cause several underlying conditions that leave people more vulnerable to Covid-19. People with higher levels of PFAS in their bodies are more likely to [gain weight](#) and have a harder time [losing it](#). The chemicals not only increase obesity risk in those exposed, but also in the [granddaughters](#) of women who were exposed. And PFAS is associated with [asthma](#) and [hypertension](#), two other conditions that appear to worsen people’s chances of surviving Covid-19. PFAS causes kidney disease and [elevates](#) levels of cholesterol and other fats in the blood, which also increase the chances that people with Covid-19 will be hospitalized or need intensive care.

The [vast majority](#) of people who die of Covid-19 had at least one other illness before they got sick from the virus. Compared to people who didn’t have underlying conditions, patients who had kidney disease, diabetes, lung disease, and heart disease, among other conditions, are six times as likely to be hospitalized with Covid-19 and 12 times as likely to die, according to the [most recent data](#) from the CDC.

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In addition to causing medical problems that make people more vulnerable to the coronavirus, several environmental contaminants, including PFAS, also directly weaken the body’s immune response. Studies have shown that in both adults and children higher levels of certain PFAS chemicals were associated with weaker responses to vaccines. The Agency for Toxic Substances and Disease Registry, a division of the CDC, recognized this evidence in an [announcement](#) it recently posted to its website on the “potential intersection between PFAS exposure and Covid-19.”

With the pre-pandemic knowledge of the effects of individual chemicals and the maps showing that Covid-19 is ravaging polluted areas, the next step for researchers is to address how exactly chemicals make individual people more susceptible to Covid-19. “We now know pollution is associated with increased infections and more hospitalizations,” said Birnbaum. “So it has a role. The question is how much of a role and how do you show that an individual is getting sick is because they have higher levels?”

Philippe Grandjean, a Danish scientist who was the first to show that children with relatively high PFAS levels had immune deficits and were more likely to get respiratory infections, has already begun to try to answer this question. Grandjean is in the process of collecting blood samples of people who were hospitalized with Covid-19 — “just a few drops of the serum from leftover blood samples that hadn’t been used” — analyzing them for PFAS levels, and comparing them with PFAS levels from the blood of people who were infected with the coronavirus but not hospitalized.

“We really need to understand the connection between exposures at the individual level and Covid-19 severity,” Grandjean said. While noting that several environmental contaminants likely increase the risk of the disease, Grandjean expressed particular concern about PFAS compounds because they can remain in the body for years and some of them tend to concentrate in the lungs. Grandjean, who is conducting the research in Denmark, hopes to have results of the study within the year.

Others are using animal experiments to explore how chemical exposure affects the impact of the coronavirus. Paige Lawrence, a professor of environmental medicine at the University of Rochester School of Medicine and Dentistry, plans to infect mice with a mouse-adapted human coronavirus that was built from the 2003 SARS pandemic and study how exposure to PFAS alters the course of the viral infection.

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“We need to understand at a cellular level what’s changed” by chemical exposure, she said. “We can’t improve health if we don’t know what we’re trying to fix.” Lawrence’s past research has shown that the environmental contaminants dioxin and PCBs change the immune system by binding to receptor cells — an effect that, in the case of dioxin, lasts for generations.

While the research is underway, many of the people in highly polluted communities worry about the greater risk they may face during the pandemic. “I think about it a lot,” said Hope Grosse, a resident of Warminster, Pennsylvania, who developed stage 4 cancer while drinking water that had been contaminated with PFAS from firefighting foam used at a nearby naval base. “My immune system was definitely impacted.” Grosse, who had 25 lymph nodes removed during her cancer treatment, resumed her work as a realtor last month and wears gloves and a mask when she shows houses. “I’m as careful as I can be, but I still worry,” she said.

Whatever we learn from the research now in the pipeline, some scientists say there is already enough evidence to lay blame for at least a portion of the toll of the virus on chemicals — and their manufacturers.

“Endocrine-disrupting chemicals are clearly involved in driving the comorbidities and are heightening mortality risk from Covid-19,” said Pete Myers, founder and chief scientist of Environmental Health Sciences. “You can’t hide from that truth.” Myers is one of several environmental scientists who have been pushing for more than a decade — with little success — for government to limit the use of these chemicals.

“The American Chemistry Council has impeded our ability to develop meaningful regulations,” said Myers, referring to a powerful chemical industry trade group. “And the result of that is that these comorbidities have become epidemic over the last three decades. And now more people are dying than would have.”

[theintercept.com](https://www.theintercept.com), 27 June 2020

<https://www.theintercept.com>

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Indoor air pollution and heavy metals linked to child obesity

2020-06-25

When it comes to our bodies, we are what we eat—or so the adage goes.

“Conventionally, obesity research focuses more on diets, physical activity, and a sedentary lifestyle,” Xiaozhong Wen, associate professor at the University of Buffalo, told EHN.

But to explain the childhood obesity epidemic, researchers are increasingly looking beyond the usual culprits, like fast foods, for more ubiquitous and insidious causes in the environment.

A team of international researchers has found that exposure to certain indoor air pollutants such as particulate matter and nitrogen dioxide and some heavy metals is linked to child obesity. The study, published today in *Environmental Health Perspectives*, is the first of its kind to test for a wide range of environmental exposures that could cause obesity. The results reinforce previous studies linking air pollution and smoking during pregnancy to obesity, and offer a new model for evaluating the complex environmental influences on health.

Obesity plagues U.S. children and teens—roughly 18 percent of youth aged 2 to 19 years old are obese, according to the Centers for Disease Control and Prevention. Obese children worldwide face an increased risk of type 2 diabetes, cardiovascular disease, and cancer as adults, and that trajectory sets in early.

While diet and lifestyle are still major factors in children’s weight, studies have shown that common chemical contaminants in plastics, tobacco smoke, pesticides and cosmetics can interfere with hormones during early development and in the womb. Meanwhile, the layout of neighborhoods and cities may discourage walking, or lack green spaces for children to play in.

These myriad variables contribute to an individual’s “exposome,” a concept originally conceived to describe the various environmental causes of cancer.

The new study attempts to piece together the exposomes of children across six countries in Europe, and identify environmental factors associated with an increased risk of obesity. The HELIX (Human Early-Life Exposome) project assembled 1,300 children between the ages of 6 and 11, and their mothers, from long-term population studies in France,

But to explain the childhood obesity epidemic, researchers are increasingly looking beyond the usual culprits, like fast foods, for more ubiquitous and insidious causes in the environment.

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Greece, Lithuania, Norway, Spain, and the U.K. Nearly a third of the children in the cohort were overweight or obese.

Among the environmental exposures they compiled were road traffic noise, access to green space, UV radiation, and chemicals used in pesticides and water disinfectants.

“Usually we only look at one or a few exposures in one study,” said Wen, who was not involved in the HELIX study. “This one is pretty ambitious.”

Twenty-seven of the 96 childhood exposures the researchers tested for turned out to have positive associations with obesity. Backing up decades of evidence, the researchers observed that children whose mothers smoked during pregnancy had increased rates of obesity. While chemicals commonly used in pesticides weren’t implicated in weight gain, indoor pollutants like particulate matter and nitrogen dioxide were. These can arise from household heating, secondhand smoke, and car exhaust.

Unlike many adverse environmental exposures, which disproportionately afflict low-income families, indoor exposure to nitrogen dioxide was a heightened factor in obesity among children in high-income households.

With the COVID-19 crisis keeping children cooped up at home, such indoor “obesogens”—chemical compounds that are linked to obesity—are even more important to investigate.

Children growing up in urban, densely-populated areas also had higher body mass indexes, a measurement of body fat based on height and weight.

One aim of the exposome approach is to cast a wide net and explore exposures that haven’t yet been studied in relation to obesity. One unexpected finding: the researchers saw high levels of the heavy metals copper and cesium in the blood of obese children, a finding they say merits further study.

“We took 100 exposures, but there are probably thousands in our environment that could be of concern,” said Martine Vrijheid, Research Professor at the Institute for Global Health, Barcelona and lead author of the HELIX study. “There’s much more to be done in looking at how the different exposures interact together.”

The study doesn’t prove the exposures cause obesity; it’s possible that some, like the heavy metals, could accumulate in body fat rather than cause obesity. But the researchers hope that their holistic model will open

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up new avenues of research, and eventually inform policy that considers broader aspects of children’s health. “It’s a start,” said Vrijheid.

In the U.S., it’s projected that by 2030 half of American adults will be obese. Yet we know “startlingly little” about how environmental stresses affect health during development, Yeyi Zhu, research scientist at Kaiser Permanente Northern California Division of Research, told EHN.

“This is a rapidly growing field of increasing interest in the scientific community,” she said.

In 2016, the National Institutes of Health launched its Environmental Influences on Child Health Outcomes (ECHO) program, which will map the exposomes of more than 50,000 children in the U.S. and Puerto Rico.

The children who took part in the HELIX study are now teenagers. “It’s now six, seven years since we last examined the children,” said Vrijheid, adding that HELIX has received funding to check back in with the original cohorts to evaluate the effects of their exposures over time. “We’re very excited about that.”

ehn.org, 25 June 2020

<https://www.ehn.org>

Why strange and debilitating coronavirus symptoms can last for months

2020-06-24

WITHIN 24 hours of asking an online covid-19 support group if anyone had been experiencing prolonged or unusual symptoms, I had been messaged by 140 people. The list was mind-boggling and deeply upsetting. “I feel like I’m in the middle of a waking nightmare,” said Zoe Wall, who was previously fit and healthy. Two months after developing covid-19-like symptoms, she was still experiencing chest pains and “fatigue beyond description”.

Harry’s symptoms started with a terrible headache and itchy body, followed by shortness of breath. He was still experiencing breathing difficulties, chest pain, numbness in his arm and bloating 10 weeks later. Jenn had had no sense of smell or taste since testing positive for covid-19 on 31 March. Abbi had minimal respiratory symptoms, but very bad gastric ones and lost 19 kilograms in two months. Others reported fatigue, headaches, tingling fingertips and brain fog.

The long list of symptoms also seems to suggest there might even be several subtypes of the disease, which could help us predict which cases will become serious.

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As the months tick by since the start of the coronavirus pandemic and we learn more about covid-19, it is becoming increasingly evident that even mild cases can have distressing and long-lasting effects. "There's clearly something going on here. It is not their imagination or hypochondria. It doesn't even seem to be linked to how severely they had the disease, as far as I can see," says Danny Altmann, an immunologist at Imperial College London. All this means we need to rethink how we diagnose and treat covid-19. The long list of symptoms also seems to suggest there might even be several subtypes of the disease, which could help us predict which cases will become serious.

When the pandemic was announced in early March, the prevailing view was that we were dealing with a respiratory infection that had symptoms similar to flu, and that while a minority of people would develop pneumonia and need breathing support, most would experience a mild illness characterised by a cough, fever and shortness of breath, which would be over in a couple of weeks.

Some of the first clues that the coronavirus behind covid-19, SARS-CoV-2, might trigger more widespread disease began to emerge in February, when the outbreak in the Chinese city of Wuhan was at its peak and doctors in the Lombardy region of Italy were also experiencing a surge in cases. As their emergency department colleagues fell sick, doctors like Sebastiano Recalcati, a dermatologist at Alessandro Manzoni Hospital in Lecco, Italy, began taking over the care of those hospitalised with covid-19. He noticed skin problems in around 10 per cent of the covid-19 patients he encountered. Some symptoms, like a flat red rash on people's torsos, could have had other causes besides the virus, but others were more specific: some patients developed small blisters on their torso or around their mouth – similar to those seen in chickenpox, except that they weren't itchy.

Since then, he and others have documented other skin symptoms, including a reddish-purple rash, caused by tiny clots in blood vessels, and chilblain-like lesions on the toes. Unlike the earlier rashes and blisters that Recalcati spotted, which seem to strike at the time of infection, these additional symptoms occur several weeks later. "We think they may be a delayed immune response, whereas the other types of rash may be a direct viral response," he says.

That was just the start. By mid-March, the virus had spread across Europe and many countries were announcing lockdowns. As epidemiologist Tim Spector packed up his lab at King's College London, he pondered

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how he might continue his research, on the health differences between twins, from home. Together with the technology company Zoe, Spector developed an app to allow the twins in his study – and maybe the general population – to log and track any potential covid-19 symptoms they developed, so they could be monitored over time.

"Hardly anyone's symptoms are the same the whole way through"

The Covid Symptom Tracker app launched on 23 March – the start of the UK's own lockdown. Within 36 hours, it had been downloaded by 1 million people, and by 29 March they had 1.5 million users, of whom 1702 reported having been tested for covid-19. "That's when we started to see this lack of smell coming up as the top feature, present in 60 per cent of people who had positive tests," says Spector. This is higher than fever or cough, in predictive terms, he says, because some of those who tested negative for the coronavirus also had fever or cough. Studies in China and Italy have also found loss of smell and taste to be quite common in people with covid-19. As a result, loss of smell and taste are now recognised as a key symptom by several health bodies including the NHS.

Other predictors currently being investigated are severe muscle pain, which seems to differ from the general aches and pains you get with the flu – "it can be very acute and very painful", says Spector – and loss of appetite, which may be connected to the loss of taste or smell. Spector himself lost 3 kilograms within a week of developing relatively mild covid-19.

The list of unexpected symptoms doesn't stop there. Other covid-19-associated gastrointestinal problems, such as diarrhoea, nausea and vomiting, have been reported by researchers in California and Hong Kong, and many doctors are reporting neurological symptoms ranging from headaches and dizziness to seizures and hallucinations. There have also been reports of covid-19 patients being discharged from hospital, only to return several weeks later with a deep vein thrombosis or blood clot on the lung, says James O'Donnell, director of the Irish Centre for Vascular Biology in Dublin.

"The extreme fatigue is like being hit over the head with a cricket bat"

Some relatively young and healthy people with mild covid-19 are having heart attacks or strokes with unusual features. "The strokes seem to involve multiple different parts of the brain, and some of them are occurring and progressing despite patients being on standard blood thinners," says O'Donnell. "This started off as a respiratory illness, but within the space of

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a couple of months we've now got this kind of multi-system phenotype that we don't really understand very well."

Then there is the extreme fatigue. Paul Garner, who had to stop working after coming down with covid-19 in mid-March, likens the feeling to being hit over the head with a cricket bat. "Calling it post-viral fatigue isn't helpful because the fatigue has been there from day one, and runs alongside some quite nasty, life-threatening conditions," he says. "It also implies we know what's happening and that the virus has gone – but we don't know any of this stuff really." Now, three months later, he can only work for 20 minutes at a time before needing to lie down, and will soon return to work for an hour a day. Garner says his symptoms are the same as chronic fatigue syndrome, with one difference – CFS is defined as not having a cause. "This clearly has a cause," he says.

Garner speaks with authority. A professor of infectious diseases at Liverpool School of Tropical Medicine, he has experienced many of the diseases he studies first-hand. The only one that is vaguely comparable, he says, is dengue – a mosquito-borne illness characterised by bouts of exhaustion long after the virus clears. "The weird thing with covid-19 is how it sort of goes away, and you feel a bit muggy and a little bit drained and then you feel a bit better and then, whack, it comes at you again from another direction."

It is this persistent nature of some cases of covid-19 that troubles many of those who contacted me via the online support group. A big frustration is the sense that because they don't require hospital treatment, their symptoms aren't taken seriously, and they are largely left to fend for themselves. "We keep being dismissed as anxious people who haven't yet given their bodies time to heal," said Wall. This lack of medical support really does make her anxious. "I feel utterly abandoned and left on my own," she says.

Not everyone is surprised that SARS-CoV-2 is causing such varied and persistent symptoms. Julian Hiscox is a virologist at the University of Liverpool, UK, who has been working with coronaviruses since the early 90s, including the one that causes MERS. "Nothing that we are seeing with this coronavirus has not been seen with other coronaviruses," he says. "We know from animal studies that the same coronavirus can cause many different types of clinical disease. We also know from our experience with SARS and MERS that some people are fine, whereas others are worse off."

Immune reset

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The same applies to longer-term health issues. Around 28 per cent of people who had SARS were still experiencing impaired lung function 18 months after SARS symptoms started, affecting their ability to exercise and their overall quality of life. And a recent meta-analysis suggested that depression, anxiety, insomnia and fatigue were all found in about 10 to 20 per cent of patients in the months following recovery from SARS. "If covid-19 plays out anything like SARS and MERS, there will be quite a bit of this longer-term mental illnesses and fatigue," says Ed Bullmore, a neuroscientist at the University of Cambridge and author of *The Inflamed Mind*.

This isn't just about the psychological trauma of being seriously ill. According to Bullmore, it is a product of our immune system's response to infection. When our immune cells encounter an invader, they release signalling molecules called cytokines to rally further immune help. Some of these cross into the brain and trigger further cytokine secretion and inflammation. "People who get infected with this new coronavirus often have this hyper-intense inflammatory reaction and being in such an inflamed state will have a negative impact on brain health," says Bullmore. Specifically, it can damage nerve cells in areas of the brain responsible for emotion regulation.

Inflammation may persist long after SARS-CoV-2 has been cleared from the body. "The healthy response to this virus is to have massive immune cell activation," says Altmann. "It would not at all surprise me if that could slightly reset the set point of your immune response in a slightly pathological and chronic way."

Exhaustion could also be linked to vascular symptoms, such as blood clots, which may be caused by the immune system or by the virus infiltrating the cells that line blood vessels. Microclots in the lungs could reduce oxygen supply by restricting the movement of oxygenated blood through the lungs. "We think we've probably got a positive feedback loop going on where we've got pneumonia followed by micro-clots in the lungs, followed by low blood oxygen, and those things go round and round in a circle," says O'Donnell. It is unclear whether microclots are occurring in people with mild cases of covid-19, but if the body isn't getting enough oxygen, this could cause many of the long-term symptoms people are experiencing, such as shortness of breath, headache and exhaustion.

Another source of prolonged inflammation could be the gut. Cells lining the gastrointestinal tract have a receptor called ACE2 on their surface – the same receptor that SARS-CoV-2 uses to gain access to lung cells – which

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suggests they could become infected and inflamed. Researchers in Hong Kong have also identified an altered gut bacteria profile in people infected with the virus, characterised by large numbers of harmful bacteria and the depletion of beneficial ones. These changes persisted even after the virus had been cleared from the body.

“It’s this prolonged phase of disruption that I’m worried about,” says Siew Ng at the Chinese University of Hong Kong, who led the research. “If the bacteria in your gut have not recovered, you may have some lasting fatigue, discomfort or loss of appetite, and it may also make you more susceptible to other infections.”

One question raised by many of those experiencing persistent symptoms is whether they are still infectious. Kim Clarke, who lives in Surrey, UK, has repeatedly tested positive for the coronavirus in her blood since losing her sense of smell on 1 April. She has been caring for her three children at home, despite severe and ongoing breathlessness, fatigue and headaches. “They’re saying, because I’ve had the virus for so long, that I can’t still be infectious, but I don’t think anyone knows anything really,” she says. “At least it helps explain why I still feel so rough. I can’t leave the house because I can’t walk, I can’t breathe.”

“People are destroyed by this. They never expected it to be long term”

The fact that viral RNA can be detected in some people weeks after diagnosis could imply the presence of some active virus, says Hiscox. However, “whether there is enough of it to cause an infection in someone else, we just don’t know at this stage”.

Another question is what proportion of those infected with the coronavirus are experiencing prolonged symptoms – and how long these can be expected to last. Here, Spector has some insights. Having now tracked some 2000 people with positive tests, he has found that the median duration of symptoms was 10 days, but they sometimes endured for extended periods. One in 10 people had symptoms lasting longer than three weeks, and one in 20 had experienced symptoms for longer than a month.

“Hardly anyone’s symptoms are the same the whole way through, and we think we are actually seeing six different subtypes of disease, based on the groupings of symptoms and their timings,” says Spector. The clustering of these symptoms may even help to predict who is more likely to need hospitalisation. “It looks like illness with a really acute and more classic flu-like start seems to be over quickly and people recover, whereas these

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other ones that are a bit more complex seemed to linger on more – but we need a bit more data to be completely confident,” he says.

Further studies on the aftermath of covid-19 are urgently needed. “We are desperate to get our lab studies in place to understand some of these longer-term symptoms and the consequences of this infection,” says Altmann. “I’ve had lots of contact with people who are really destroyed by this. They never expected it to be a long-term chronic problem.”

Until now, much of the response to covid-19 has been about preventing deaths, but hospitals are beginning to establish clinics to follow-up the survivors – including those who are still ill. “I’m certainly hoping that if folks like us can work out some of the biological mechanisms of this disease, there will be therapeutic ways of getting around it,” says Altmann.

For Wall, this won’t come a moment too soon. “My life has changed so dramatically. I don’t know how to adjust to this. I don’t know that I want to. I just want my life back.”

[newscientist.com](https://www.newscientist.com), 24 June 2020

<https://www.newscientist.com>

From the lab to the field, agriculture seeks to adapt to a warming world

2020-06-25

It may be coming to a bakery near you: Bread made from wheat that has had its photosynthetic mechanism refashioned to help it flourish on a warmer planet.

Despite the fact a number of researchers — some funded by the Bill and Melinda Gates Foundation — are scrambling to create this new breed of wheat, it won’t be arriving any time soon. Increasing temperatures are already taking a toll on the world’s wheat fields. But a new heat-resistant wheat that will replace the types currently grown is a decade or more off in the future.

“The largest single global change that threatens food security is high temperature,” said Donald Ort, a professor of plant biology and crop sciences at the University of Illinois who is working on a project called RIPE — Realizing Increased Photosynthetic Efficiency — to enhance photosynthesis in food crops, which would also help beat the heat.

All this comes at the same time the demand for food is rising and may increase by 100 percent by 2050 as the global population soars from 7.6 billion to nearly 10 billion.

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The problem is being seen throughout the world. In 2010 and 2012, for example, Russian wheat growers saw their yields decline dramatically because of a combination of hot weather and drought.

“It caused 30 percent reduction in national production, which is really huge,” said Senthold Asseng, a researcher at the University of Florida. Russians made up for the shortfall by reducing exports, he noted, but “If you lose a third of your production in India or Bangladesh that could be a huge disaster.”

There is a concerted global effort to help agriculture adapt to the new climate reality as warming continues apace. The most urgent adaptation initiatives, experts say, involve the world’s main food crops — especially wheat, rice, corn, and soybeans, which together provide two-thirds of human caloric intake. In a [study](#) released last year, the Intergovernmental Panel on Climate Change (IPCC) warned that without fundamental changes in agriculture, the world risks increasing food insecurity.

It’s not just about food. Food shortages are an important driver of social problems. For example, a drought from 2007 until 2010 is considered [one of the main factors](#) leading to the civil war in Syria.

A [2017 study](#) by a group of researchers that included Asseng used models to forecast changes to these main crops under warmer temperatures. The study showed that each centigrade degree rise of temperature would cause a drop in production of all of the crops, led by a plummeting yield in corn of more than 7 percent, wheat of 6 percent, and a drop in soybeans of 3 percent, and rice 3.2 percent. “That means in the next 30 or 40 years, if global temperature rises 3 degrees Celsius we’re talking about 15 to 20 percent loss of wheat yield just from temperature alone,” Asseng said.

Climate change brings more than just higher temperatures. A whole suite of problems and benefits come with warmer weather, from too much to too little precipitation (there’s 7 percent more moisture in the atmosphere for every 1 degree C of warming); changes in the timing of precipitation, floods, and erosion; abrupt temperature swings; changes in soil health; and more wildfires, which can affect planting, ripening, and harvesting. Warmer temperatures may also mean more pests, more diseases, and more weeds. And along with the loss of yield, some studies show that important food crops, such as rice and wheat, have reduced levels of protein, iron, and zinc as they grow in a more carbon-rich environment.

All this comes at the same time the demand for food is rising and may increase by 100 percent by 2050 as the global population soars from 7.6

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billion to nearly 10 billion. And as the world shifts from fossil fuels to plant-based materials, such as biofuels or bio-plastics, experts say it will require a 30 percent increase in agricultural production. All of this increase will have to be done on agricultural land already in existence so that the Amazon rainforest or other important natural areas won’t need to be destroyed.

Wheat — the largest food crop on the planet, supplying 20 percent of global calories — is getting a lot of the attention from researchers. One of the leading approaches to increasing yield and creating a heat-tolerant wheat is in the optimization of photosynthesis. “Agricultural crops now convert a surprisingly low percentage of sunlight into plant biomass, some 0.5 to 1 percent,” said Martin Parry, a leading researcher at Lancaster University in England. “Doubling the percentage to 1 to 2 percent is all we need, and this has already been scientifically proven to be possible.”

Researchers are doing this by focusing on something called Rubisco — an acronym for Ribulose-1,5-bisphosphate carboxylase/oxygenase. It’s an ancient enzyme, more than 3.5 billion years old, that evolved with plants. It takes inorganic carbon dioxide and turns it into organic carbon.

But 20 percent of the time, Rubisco grabs oxygen instead of CO₂, which leads to a process called photorespiration, which is energetically expensive for the plant and leads to less photosynthesis and smaller yields.

Ort calls Rubisco the most important enzyme on the planet because it is responsible for converting sunlight into plant tissue, which feeds the world. However, Ort says, “It’s not a very good enzyme. It’s slow. And it makes mistakes. It’s the most abundant enzyme on the planet, and the reason is the way the plants cope with its not being a very good enzyme is to make a lot of it.”

What the University of Illinois’s RIPE program and Lancaster University and other labs are focusing on is hacking into the plants to boost the efficiency of Rubisco. “There are more simple ways to do it,” says Ort. “These are complete redesigns to try to bypass the native pathways and replace them with a simpler, more efficient pathway” that doesn’t impinge on photosynthesis.

Even with the focus on redesign for photosynthesis, experts say a new cultivar of wheat is at least 10 or 12 years away.

At least one type of wheat that thrives in high temperatures has been grown successfully. Researchers from the Swedish University of Agricultural Sciences and the International Center for Agricultural

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Research in the Dry Areas created a wheat crop from ancient and modern strains that can grow in temperatures above 100 degrees. It's being grown in the Senegal River Basin in West Africa.

Rice, soybeans, and other crops would also benefit from a new, redesigned photosynthetic process. Rice, which is a food source for 3.5 billion people globally, is especially vulnerable. Not only is its yield hurt by higher temperatures, but it also needs a dependable supply of water — it uses 34 to 43 percent of the world's water supplies for irrigation — and the effects of high temperatures are compounded by irregular weather patterns and the decline in aquifers. [Saltwater intrusion](#) as oceans rise is also a serious problem.

A [recent study](#) in the journal *Nature* found that a warming climate is increasing the level of arsenic in rice, which by 2100 could reduce yields by nearly 40 percent.

There are efforts on a number of fronts to prepare rice for the climate emergency, including developing types that are drought, disease and saltwater resistant. The IR8 variety of rice, for example, which was integral to the Green Revolution in the 1960s, is being phased out in places in favor of native cultivars that are easier on the soil and more disease-resistant.

And a team of U.S. researchers are editing the genome of rice in tests to add disease resistance or edit out genes that make the plant susceptible. They look for a plant that might have poor yield but has good disease resistance and then remove the resistant genes and place them in a high-yielding commercial variety. "Genome editing allows us to do that with speed and accuracy," Adam Bogdanove, a professor of plant pathology at Cornell University, said.

Researchers in Arkansas, where much of the U.S. rice crop is grown, have found that over the last four decades nighttime temperatures have increased by 5 degrees Fahrenheit, which means plants lose more water at night. The increasing heat also reduces photosynthesis and hampers the ability of rice to self-pollinate. Some farmers are talking about moving further north to stay within the crop's temperature range.

There are other approaches to making agriculture more tolerant in the face of hot temperatures, such as changing the timing of crops or employing agricultural methods that can help crops stay cooler. A [recent study](#) in *Nature*, for example, found that farms in tropical regions that diversify with a mixture of interwoven crops and a border of native forest,

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instead of a monoculture, help keep the agricultural landscape cooler while also providing more habitat that fosters biodiversity, especially birds.

In addition to crops, livestock and other animals raised for food are also being affected by climate change. Chickens, for example, are especially susceptible to heat.

One of the more intriguing solutions is the Naked Neck chicken. It's an odd-looking bird that appears as if its feathers have been plucked from the bottom of its neck up to its head. What it lacks in beauty, though, it makes up for in function in a changing climate.

These chickens, originally from Romania, are not only naturally air conditioned because of the lack of feathers, they have bigger lungs than other birds and other important physiological traits that allow them to adapt to warmer temperatures. "It's leggier too," said Matthew Wadiak, founder of Cooks Venture, which is pasture-raising and selling these birds in Arkansas. "If you have a leggy bird that is upright and off the ground it has more airflow around it and it can stay cooler."

Ranchers and scientists are also looking for cows that can thrive in warmer temperatures. A breed of animal that may help ranchers in the U.S. Southwest and other arid regions adapt is the *raramuri criollo* cow — which means "light footed ones" — as a replacement for Angus and Hereford, which have more impact on landscapes.

Drought has plagued the Southwest in recent years and some researchers say it may be a permanent fixture in the region. It has taken a heavy toll on ranching. The *criollo* were brought to North America from Spain by conquistadors and turned loose, before being adopted by, among others, the Tarahumara Indians. Over the last four centuries these cattle have adapted to arid conditions in Mexico.

Two decades ago, they were brought from the Mexican state of Chihuahua to the Jornada Experimental Station near Las Cruces, New Mexico. They have since been adopted by ranchers who have seen benefits, and The Nature Conservancy is studying their impact on the land at its Canyonlands Research Center in Utah.

"These cattle can withstand heat and lack of water," said Nichole Barger, an arid land ecologist at the University of Colorado Boulder who consults at the Canyonlands Research Center. "They are selecting a broader range of different kinds of plants, not just those grasses that are in decline because of climate change."

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The most important solution to food security over the long term, of course, is reducing greenhouse gas emissions. There is “no possibility for anybody to say, ‘Oh, climate change is happening, and we will just adapt to it,’” said Hans Otto Portner, co-chair of the IPCC working group on food and land use. “The capacity to adapt is limited.”

e360.yale.edu, 25 June 2020

<https://www.e360.yale.edu>

Is it time to replace one of the cornerstones of animal research?

2020-06-25

Last year marked the 60th anniversary of one of the most influential concepts in lab animal welfare—the three Rs. To promote the humane treatment of laboratory animals, these principles urge scientists to replace animals with new technologies, reduce the number of animals used in experiments, and refine lab protocols to minimize animal suffering. First outlined in the 1959 book, *The Principles of Humane Experimental Technique*, the three Rs have become a cornerstone of lab animal legislation and oversight throughout the world.

But as millions of animals continue to be used in biomedical research each year, and **new legislation** calls on federal agencies to reduce and justify their animal use, some have begun to argue that it’s time to replace the three Rs themselves. “It was an important advance in animal research ethics, but it’s no longer enough,” Tom Beauchamp told attendees last week at a **lab animal conference**.

Beauchamp, an emeritus professor of ethics at Georgetown University, has studied the ethics of animal research for decades. He also co-authored the influential *Belmont Report* of 1978, which has guided ethical principles for conducting research on human subjects. Beauchamp recently teamed up with David DeGrazia, a bioethicist at George Washington University, to lay out six principles for the ethical use of lab animals, which would replace the three Rs. The pair published both a **scientific article** and **book** on the topic late last year.

Top of Form

Bottom of Form

Beauchamp and DeGrazia talked with *Science* about how their new approach works, why they think it’s better than the three Rs, and whether

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researchers will embrace it. This interview has been edited for clarity and length.

Q: What’s wrong with the three Rs?

David DeGrazia: The three Rs don’t take the costs and benefits of animal research into account. They don’t ask questions like, “Is the experiment worth pursuing in the first place? Is it too expensive? Is it important enough?” It just assumes the experiment is worth doing. We want scientists to be asking these essential questions first.

The three Rs also aren’t comprehensive. They don’t discuss the basic needs of animals, for example, or set limits on how much animals can be harmed.

Q: How do your new principles solve these problems?

D.D.: The first principle is that you can only use animals if they’re the most ethically acceptable way to address the question. It goes beyond the “replacement” part of the three Rs in that scientists must not just *consider* alternatives to using animals, they must *prove* that there are no viable alternatives. An IACUC [Institutional Animal Care and Use Committee], for example, might ask an investigator to detail the science showing that animal alternatives like organ on a chip or microdosing humans aren’t viable. It puts more teeth into replacement.

Another principle would ask scientists to detail how much humans and society are likely to benefit from the research, and contrast that with how much animals are likely to suffer. Even if the benefits of using animals outweigh the costs, we want researchers to think about how they can mitigate—and even eliminate—any harms caused to animals during their experiments. Are they drawing blood more than they need to? Are they handling rodents more often than necessary?

Scientists also should be thinking about how to give these creatures the **best life possible in the lab**. That could include making sure they have companions, exercise, and other stimulating activity.

Tom Beauchamp: Finally, there should be an upper limit to how much we can harm animals, regardless of the benefits of the science. No animal should be put in a position of experiencing severe suffering for a lengthy period of time.

D.D.: If we, hypothetically, addict mice to cocaine, and then see how much of an electric shock they’re willing to endure to get their fix, we’re forcing them to live between the misery of addiction and the suffering of shocks.

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That's way too much harm to cause for whatever the purpose of the study is.

This is the only principle for which we say there might be some rare exceptions. For example, an exception might be if there's a raging pandemic and the only way to test a vaccine is to have a control group that suffers for a week or more without treatment.

Q: What has been the response of scientists so far?

D.D.: I'd say the response from researchers was halfway between warm reception and polite skepticism. The feedback has been limited so far, but I've been encouraged by the positive tone.

At the same time, some people have expressed concern about how to quantify things like the benefit to people or the harm to animals. I'm sure we will get criticism about the principles imposing extra regulations and slowing down science. But it won't slow down science if we're stopping research that doesn't provide real benefits.

Q: Do you think your principles will have as much impact as the three Rs?

D.D.: Our framework can't change the scientific culture by itself. These things take time. But our hope is that, like the three Rs, our principles will become part of the mainstream vocabulary of scientists and ultimately change their behavior. If so, I think we'll see much better science, because the models are so well-chosen, and all of the animal subjects will have decent lives.

Q: What are your next steps?

T.B.: The best way for us to push things forward is to give talks and hope that will lead to more people reaching out to us. [Their proposal came up at a **recent National Institutes of Health workshop** on nonhuman primate research.]

Q: Have you thought about a catchy name, like "the three Rs"?

D.D.: Not yet. Maybe "The six principles"? [Laughs]. We're still working on it.

sciencemag.org, 25 June 2020

<https://www.sciencemag.org>

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Born with malformed limbs 52 years ago, thalidomide victim still fights for compensation

2020-06-28

Noëlla Hébert isn't scared of anything.

The 52-year-old from Saint-Louis-de-Kent, who was born missing an arm and with malformations in her other limbs, says after a lifetime of fighting for acceptance and compensation, there isn't anything left for her to be afraid of.

"I fought all my life to be to be looked at as a normal person," she said. "This has been a battle from the beginning."

Hébert is one of three New Brunswickers who were rejected from a 2015 federal compensation program for thalidomide victims. They have been arguing even since that they deserve to be recognized, compensated and given assistance for their far-reaching physical disabilities.

'I took a drug, Noëlla'

Hébert grew up in rural Kent County knowing she was different and knowing her mother carried an enormous burden of guilt.

"I can remember my mom always said, 'I took a drug, I took a drug, Noëlla, I took a drug.' But me, I didn't understand that ... you always have in the back of your mind, 'Why did she take that pill?'"

Thalidomide, promoted as a treatment for morning sickness, was approved and arrived in Canada as samples in 1959.

Canada was one of the last countries to pull it from the shelves in 1962, but Hébert and others believe it was still in circulation in rural New Brunswick for years after.

Her mother, Marie, said that's what the local doctor gave her in 1967.

"She took sick," said Hébert. "She had a very sore stomach. She had insomnia. She couldn't sleep. And my grandma had just died. So that was the creation of all that."

She explained that in the 1960s, when the village doctor gave you a bottle of pills, you didn't ask questions.

"People were ignorant. They thought that medication were miracle cures," said Hébert. "Back then, when you had an ailment if you could have the help of a doctor — that was God."

And so I did not have the documents that the government wanted but I still was a thalidomide victim."

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There is no record that proves that the bottle of pills given to Hébert's mother in 1967 contained thalidomide. There were few pharmacies in rural New Brunswick, and it was common for doctors to give medication directly to their patients. The lack of a prescription kept Hébert and 166 others from being part of a federal compensation program for victims in 2015.

"It was just a bottle of pills that was given from one hand to the other," she said. "And so I did not have the documents that the government wanted but I still was a thalidomide victim."

'We got to push'

A 30-minute drive from Saint-Louis-de-Kent, Paul Richard was born in Rogersville in 1969 with malformed arms.

He believes his shorter-than-normal right arm, twisted hand and malformed left arm are the result of his mother also taking thalidomide.

"She was given a pill to alleviate nausea during her pregnancy and back then, well, they just took whatever doctors gave them and didn't question anything," he said.

Richard had three major surgeries on his right arm as a young child and remembers telling his parents when he was seven years old that he wasn't going to have any more.

"I made do with what I had," he said. "I played hockey all my life — I wasn't Wayne Gretzky but I had fun."

As far as he knows, his legs are fine. Richard jokes he's always been able to "run from trouble."

The husband and father of two worked as a heavy equipment operator at his father's business when he finished school. When he could no longer cope with the physical demands, he changed careers and became a highway maintenance supervisor and now works in an office.

Richard said he probably would have given up his battle for compensation, but Hébert is his mentor and if she keeps fighting, he will too.

"Thank God for Noëlla. I would give up but she keeps on telling me, 'We got to push.'"

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'My body is my record'

Hébert, Richard and another New Brunswick man, from Val-Comeau, near Tracadie-Sheila, were among the 167 people who were rejected from the 2015 Thalidomide Survivors Contribution Program, which included a lump sum payment of \$125,000, ongoing support payments and access to a medical assistance fund.

Even though their mothers have both signed affidavits saying they took thalidomide while they were pregnant, and even though genetics reports and doctors all point to thalidomide as the cause of their disabilities, neither Richard nor Hébert qualified.

"They put us all in the same basket that we would all try to fraud the system," Hébert said of the third-party the government hired to determine who would qualify for the government program.

"But we're not fraudsters, we are victims. It's really really clear to see my body is my record — When you see me you can't unsee me."

Gesturing to her missing left arm, she points out the tip of a finger that pokes out of her shoulder. Her right arm looks normal, but has four skeletal malformations, including a thumb that is more like a fifth finger.

Her "good leg" does not have a hip and she has required reconstructive surgeries to allow her to walk. On the other side, she has a very short leg that is attached to her torso, again with no hip. She has undergone a surgery to turn her small foot backwards so she can use her heel as a makeshift knee in her prosthetic leg.

Forgotten victims

After 52 years, Hébert explained, her continued fight isn't about the money.

She wants Canadians to recognize that she and others have lived their entire lives with severe disabilities and discrimination.

Hébert considers herself one of the "lucky" survivors, because she was born with a "firecracker personality" and a family who saw her as normal.

"My mom says that ... when she looks at me, yes, I'm deformed. But when she looks aside she pictures me as a normal child. That's the picture she had to create in her mind to be able to cope with this."

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Hébert laughs as she remembers her big brother's reaction when, as a child, she told him she wanted to learn to swim.

"He said, 'OK, let's go.' There was no, 'How are we going to do that?' or 'You can't do it.'"

Hébert went on to attend university and to become a lawyer. It was one of the most difficult times of her life not because of the academics, but because it was nearly impossible for her to walk from her dorm at the University of Moncton to her classes.

"When you only have one leg and you have to walk in three inches of snow and the leg's not going — that was my biggest, biggest challenge," she said. "How many times I fell on the snow, in the snow with my 50 pounds of books on my back and came to my dorm crying and called my dad, my mom."

Again, Hébert's family encouraged her not to give up when she was ready to quit.

"My dad would say, 'Well go to bed, pray, put some A535 [medicated cream] and the first thing I want you to do when you open your eyes, call me and tell me how is it going.' And just on cue the next day it was always going a little bit better."

Hopes rise and fall

In January 2019, Hébert and Richard were hopeful once again when then minister of health Ginette Petipas-Taylor announced a new compensation program for those turned down in 2015.

The Canadian Thalidomide Survivors Support Program promised a one-time payment of \$250,000, annual payments based on the person's level of disability and access to a medical assistance fund.

But their hopes were quickly extinguished. This time the hurdle wasn't missing documents, it was birth dates.

The first step of the preliminary screening for the new program is that you were born within five years of March 2, 1962, when thalidomide was pulled from shelves in Canada.

"They said, 'Well if the drug was still on the shelves after five years that we pulled it off the market, it should have been expired.' And then they added nine months for the birth of the child," Hébert said.

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Anyone born after Dec. 21, 1967, will not be considered for compensation in this latest program. Hébert was born five weeks too late, on Jan. 31, 1968.

"It's the most ridiculous thing I've ever seen but I'm not surprised," she said. "We supposedly die about 10 years to 15 years younger of what we are supposed to. They're just playing with time."

Quest for closure, compensation

"We always miss the boat," said Richard.

For him, the compensation would "help immensely," but more important would be to finally be recognized as a victim.

"I know everyone wants something from the government," he said. "We didn't ask for that pill to be introduced in Canada, but we had to deal with the consequence."

Richard understands the fact that his birthday also falls outside of the eligible dates is a hurdle, but he hopes it won't be insurmountable.

He is calling on the Canadian government to consider what life was like back in the 1960s in rural New Brunswick. It was a time when doctors handed out medication, and no one threw anything away.

"All those medications could have stayed in a medicine cabinet for a few years and when they needed it, they would take it."

Like Hébert, he worries his body will continue to deteriorate, and he will need more support as he gets older.

Judge urges government to reconsider

The legal battle for Hébert and Richard continues. This month they appealed a ruling by Federal Court Justice Michael Phelan that would effectively close the door to them ever receiving any compensation.

Lawyer Alyssa Tomkins, a partner with Caza Saikaley, is representing Hébert and Richard, along with another New Brunswicker, pro bono.

She explained the 167 people who were refused government compensation in 2015 had launched a class-action lawsuit, which was settled in May.

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The settlement order applies to all members of the suit, including Hébert and Richard, and means they have to accept the new 2019 program, even though it excludes them and 40 others based on their birth dates.

Tomkins is arguing that based on the negative or “deleterious” effects of the settlement on so many class members, the order should be set aside.

“Effectively, the settlement provides little benefit, we’ve alleged, to class members within the birth date framework. And yet it’s devastating to those outside it,” she said.

Let’s work with integrity and let’s show our hearts. We may have done mistakes in the past but it’s never too late to show compassion. - *Noëlla Hébert*

Tomkins worries that if the settlement holds up, it will make it “extremely difficult” for victims to ever get the government aid they are entitled to.

In his ruling, Phelan also raised concern about the birth date parameters set by the 2019 compensation program and said there was a “less than clear” explanation from government as to why it was necessary.

“Canada’s explanation for its rigid approach, while coldly scientific, lacked the compassion for the individual which the government espoused,” he wrote.

“Some of the individuals failed to qualify by a matter of a few weeks — their stories were tragic and compelling. Class counsel recognized the problem but on this issue Canada was intractable.”

Phelan said if it was within the power of the court, he would have struck out the date parameters.

“Regrettably, the court is powerless to do anything about this issue, other than to encourage a compassionate reconsideration.”

Phelan goes on to acknowledge that class members are advancing in age and have increasing requirements because of their disabilities.

“Time is not their friend, if not yet their enemy.”

Despite this setback, Hébert is undeterred and ever hopeful that the many politicians she has met with over the years will reconsider and put an end to this “nonsense.”

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“It’s never too late. We can say, ‘The past was the past. Let’s talk with integrity now. Let’s work with integrity and let’s show our hearts.’ We may have done mistakes in the past but it’s never too late to show compassion.”

‘I am a hero of history’

Hébert’s sense of humour is still intact as she talks about some of the accommodations she needs to continue to live in her own home.

“I don’t have a ramp to bring my scooter with me in my truck. I don’t have a ramp outside my door. I don’t have the [modified] steering wheel because my steering wheel is too heavy for me to turn on my SUV.”

“It costs an arm and a leg — which I don’t have,” she jokes.

She knows the body she was born with will never allow her to do what her spirit would like, but she still looks forward to a day with simple accommodations — raised garden beds, for instance, so she can grow plants on her deck.

“It’s about the recognition of being who I am,” she said.

“I am a hero of history. I’ve conquered the world with a not normal body and instead of looking at us with eyes of pity, they should say to us, ‘Oh my God — you’re champions. You should have a medal.’”

cbc.ca, 28 June 2020

<https://www.cbc.ca>

In Canada’s far north, we only ate local for a year. I was transformed

2020-06-29

I haven’t eaten a piece of broccoli in nine months. Not because I have anything against broccoli. But because it’s been nine months since it has grown where I live — in Dawson City, Yukon, 300 kilometres south of the Arctic Circle. I will relish the taste of broccoli in another month when it once again fills the bins at my local Farmers Market. And then I will give it up in the fall. And you know what? I’m OK with that.

A few years ago, I spent an entire year with no grocery store food in my house — feeding my family of five only food that can be hunted, fished, foraged, grown or raised around Dawson City. In the process, I was forced to eat seasonally. “Joyous” is not a word I usually use. But having recently chomped into my first leafy greens after a long Yukon winter, I have

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discovered that eating seasonally is actually quite joyous. The appreciation I will soon feel for my first slice of cucumber, the burst of flavour from a ripe cherry tomato exploding in my mouth and, of course, the sweetness and crunch of that first piece of broccoli — is worth waiting for! It reminds me of the days when mandarin oranges were only available at Christmas and how special that was.

So how do I cope without a leafy salad all winter? How on earth do I make a stir-fry without fresh broccoli? I have discovered the cabbage. The carrot. The kohlrabi. Root vegetables that store fresh all year in a root cellar getting sweeter and sweeter by the month. Fresh sliced cabbage and shredded carrot with your favourite dressing in the middle of January — yum! Didn't miss lettuce at all. For a stir-fry, add in a handful of kale or chopped peppers that went directly from the garden to the freezer in the fall. Delicious.

There is an old saying: in the summer, you eat above the ground. In the winter you eat below the ground. And that is exactly what I have found my body craves. By fall, the idea of salad is no longer appealing. I crave potatoes and turnip. By summer — bring on the greens!

Imagine only buying things at the grocery store that are produced in your own province. You would quickly come to understand the season for broccoli. And when strawberry season rolled around, you could count on a strawberry tasting like a strawberry or a fresh tomato actually tasting like a tomato — rather than being lured by look alike, flavourless clones year-round.

If the distance your food travels doesn't concern you. And if you don't really care about flavour. What about nutritional value? I was rather shocked to learn that 75 per cent of the vitamin C and almost 50 per cent of the folate in fresh spinach are lost within five days of picking. I wondered how much nutrition was left by the time fresh spinach from afar reached my plate. Nutritionally, among other things, in January it would make more sense to buy frozen spinach produced in your own province rather than fresh spinach from far away.

I learned a lot about myself eating 100-per-cent local to my northern community.

I am way more adaptable than I thought I was! The idea of going a year without avocados, nutritional yeast on popcorn, and my precious cup of orange pekoe tea (both drug and comfort food) was rather overwhelming. And I really wasn't sure I could go a whole year without chocolate. I

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imagined a year of suppressed cravings that would have me running to the store by year end. But I surprised myself. After the first couple of months, I actually didn't miss any of those "must haves." A shot of birch syrup on the occasional desperate day took the place of a piece of dark chocolate. By the time the year of eating local ended, I had no desire to go to the store. And, when I did finally force myself to taste those foods again, they were disappointing. (You can find a list of all the available local ingredients we used [here](#) and some recipes [here](#).)

So how could I survive without caffeine to kick start me in the morning and get me through the mid-afternoon slump? At first, I was exhausted and had to resort to afternoon naps. Not very practical for a working mother. Out of desperation, I started going to bed earlier, no longer forcing myself to stay up late to "get things done." The crazy thing is that eventually I found I had more energy off caffeine than I did on it.

What about cooking staples like lemon juice? Rhubarb juice is the answer. A Béarnaise sauce made with rhubarb juice — you would never know the difference. Lemons don't grow in my backyard, but rhubarb certainly does. The best way to juice rhubarb? Chop it, freeze it, thaw it, squeeze it!

How do you make a salad dressing without oil or vinegar? Toss frozen berries, garlic and birch syrup in the blender. Rivals an oil and balsamic vinegar dressing any day of the week!

No yeast? The pandemic has taught us all the answer to that one. Sourdough starter. In my case made from scratch thanks to the natural yeast found on juniper berries.

Baking powder? Whipped egg whites. Although honestly, for me, the absence of baking powder didn't really matter much as there was very little grain to begin with.

OK, salt you say. How do you live without salt? For the first two months, everything tasted very bland. But then my taste buds changed — they came alive! I could taste the flavours in my food again. And it was delicious. Spinach actually tasted salty. As did tomatoes and celery and moose bone broth — yum. If you eat meat and fish, physiologically you don't actually need added salt. I tested my blood every three months just to prove it. As far as preserving food without salt, there is still pressure canning, smoking and of course freezing. In the Yukon, the outdoors is my freezer eight months of the year!

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Iodine is another matter. It is added to table salt to prevent thyroid deficiency. Just like Vitamin D is added to commercial milk. Iodine, I haven't figured out yet. My iodine levels did drop without commercial salt.

Vitamin D — solved. Burbot liver! Burbot being a bottom-feeding fish that one is allowed to catch through the ice only in the depths of winter. How naturally symbiotic, since winter is when we are most in need of extra Vitamin D that our bodies normally manufacture on their own when exposed to sunlight.

Another surprise — the grazing I can forage from my own yard. Once I learned to see with new eyes, weeds became food. Now I munch while I “weed” the garden.

And then there is the tremendous amount of nutrition and flavour in the parts of the animal that we don't always think of. The sacrifice of an animal's life is not just for roasts and steaks. There is tremendous flavour from bones. Blood is full of nutrients. Roast moose heart is to die for. Moose tongue pastrami. Liver. Kidneys. Head. Bum guts. Nose — well I must admit, although a delicacy to the Tr'ondëk Hwëch'in elders, moose nose remains an acquired taste for me!

I am paralyzed by choice. I suspect this is partly why I choose to live so remotely. When you live in a community of 1,500 people, 550 km from the nearest big box or chain store, you learn to appreciate a lack of choice. Especially when shipping something to Dawson costs twice as much as the item itself.

Before my year without grocery store food, I didn't like cooking and I wasn't very good at it. But limit my ingredient choices, force me to find creative ways to “cook within my means” and lo and behold, I started to enjoy cooking and I actually became quite good at it!

I have also learned to appreciate the terroir of food. Taste and variety depend on the soil and the geography. My cabbage doesn't taste like your cabbage. (For the sweetest cabbage ever, come to Dawson City!). And the only protein sources that can be produced in my community are animal based.

It is not realistic to expect folks to take all the grocery store food out of their house as I did. But I give you this challenge. Look at the labels on the food you buy at the grocery store and consider only buying things that are produced in your own or neighbouring province. This may mean not having fresh broccoli in your stir-fry in December. Instead, find out

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what is still available from your province mid-winter and be open to new possibilities.

Check out the frozen fruit and veggie section for what was locally produced. Discover the joys of eating seasonally. You will come to be in tune with the seasonality of foods and you will be guaranteed to get the best tastes.

Seek out a few food sources that are uber-local. Local eggs are often one of the easiest things to find.

During harvest season, visit your local farmers' market. You will enjoy getting to know the people who grow your food.

If your business has outdoor planters and garden boxes, consider planting berry bushes, or snap peas instead of shrubs or flowers — foods that passersby can graze upon. Space to grow food to feed us is precious. Big spaces or small, urban or rural, food can be grown almost anywhere. Lettuce can be grown vertically in a potting soil bag on a balcony; basil can grow on a windowsill.

The pandemic has opened everyone's eyes to the fragility of a supply chain that comes from far away.

It's time to shorten the food chain. We should start relying on food from closer to home for the essentials. And start recognizing food from far away for what it is — a luxury. In this way we can build strong local food ecosystems. And when the next crisis comes our way, we can feel secure that we can, at least, feed ourselves.

After all, “First we eat, then we do everything else.” -MFK Fisher.

thetyee, 29 June 2020

<https://www.thetyee.ca>

he Anthropause: How the pandemic gives scientists a new way to study wildlife

2020-06-29

WHILE WE'VE ALL been locked inside, creatures have been reclaiming the empty streets. Earlier this month, animal control officers captured a mountain lion in downtown San Francisco. In Italy and Spain, the wild boar have moved in. OG fliers like geese are staking claim to airports. Urban

“This is a change in culture—it's not a genetic change.”

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rats are boldly foraging during the day and sleeping in cars—well, at least under the hood, where they gnaw on wiring, thinking they're edible roots.

This is an unprecedented time in modern history—and a unique opportunity for science. A group of researchers last week termed it the “anthropause” in the journal *Nature Ecology & Evolution*, a name they coined “to refer specifically to a considerable global slowing of modern human activities, notably travel.”

“There is an amazing research opportunity, which has come about through really tragic circumstances,” says lead author Christian Rutz, an evolutionary ecologist at the University of St. Andrews and Harvard University. “And we acknowledge that in the article. But it’s one which we as a scientific community really can’t afford to miss. It’s an opportunity to find more about how humans and wildlife interact on this planet.”

Historically, this has been difficult to study. Researchers might have been able to compare how species behave in a protected area versus a neighboring unprotected area, or an urban versus a rural environment. “The problem with all of these approaches is that they usually refer to just a handful of sites,” says Rutz. “And what happened here in the anthropause is that we have this global slowing of human activity, which gives us these really valuable replicates, where we can look at the effects of human activity across geographic regions, across ecosystems, and importantly, also across species.”

Take the fishers—carnivorous mammals in the weasel family—living in North America. “They were supposed to be out in the woods far away from people, and somehow they entered cities again,” says ecologist Martin Wikelski of the Max Planck Institute of Animal Behavior and University of Konstanz, coauthor on the anthropause paper. “This is a change in culture—it’s not a genetic change.”

That is, this isn’t a case of a species gradually acclimating to city life. That can come about because individual fishers plucky enough to risk the danger of moving into an urban area might prove to be more “fit”—for example, maybe they would find new sources of food that give them more energy to pursue a mate. If this behavior helps them produce more offspring, the genetics that code for urban pluckiness would get passed along too. So generation after generation, a species would adapt to city life. It’s the same principle behind the domestication of dogs: One theory goes that wolves visited human encampments for scraps, over time growing tame enough to play fetch with humans instead of biting our faces off.

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But with the fishers, the behavioral change in the anthropause happened waaaaay too fast to be genetic. Instead, it could be a change driven by choices made by individuals or groups of animals. “You see that personalities differ,” says Wikelski. “There may be now a selection for certain personalities to enter cities, and that may be propagated through their culture.”

“The global experiment on the transmission and retention of information in animal societies is just unbelievably beautiful,” Wikelski adds.

Scientists can watch such rapid, dramatic behavioral shifts thanks to increasingly sophisticated monitoring equipment. Tracking collars of course map an animal’s movement, but some now come equipped with inertial measurement units, or IMUs, the same sensors that let you shift your phone around to control a game. This allows researchers to determine if a wild animal has suddenly accelerated, indicating that it might have been startled. An even more sophisticated monitoring device might detect the animal’s heart rate or listen with a microphone to its interactions with its peers.

“It’s the Fitbit for animals,” says Wikelski. “Are they sick? Are they fine? Are they interacting? How quickly are they moving? Are they getting up at the right time, at the same time as before? Are they active differently during the night, during the day?”

During the anthropause, researchers can marry this data that tracks animal behavior with data that tracks human behavior, particularly traffic, to show whether a species might be exploiting our absence or going about its business as usual in the wild. As the anthropause continues and eventually wanes, scientists will be able to watch how a species adapts, answering questions that would have been impossible to tackle if not for the pandemic.

Researchers have been trying to solve one of these riddles for decades: Are animals afraid of our built environment—roads, buildings, and other infrastructure—or are they afraid of *us*? “We suddenly didn’t have humans in many areas,” says ecologist Matthias-Claudio Loretto of the Max Planck Institute of Animal Behavior and University of Konstanz, coauthor on the anthropause paper. So, he says, if animals will visit these places during the pandemic shutdown, “they’re obviously just normally afraid of humans.”

On the other hand, if a particular species didn’t penetrate a populated area even with humans gone these past few months, that might be an indication that it’s the built environment keeping them away. But

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conservation biologists can look at the species that *did* traipse through an area and note the paths they took.

The riddle gets more nuanced in urban places where the restrictions on movement haven't been particularly strict. Maybe a city has allowed residents to go for walks, so animals are still avoiding public parks, but are instead turning up in places that are entirely shut down to people. Some cities may have restricted driving, while others didn't—researchers can look at both traffic and animal data to see how species in different areas adapted.

The anthropause is bringing scientists a unique opportunity to study how animals move through built environments; this knowledge could inform new modifications to urban areas to provide safe passage for animals. For example, maybe if we learn that a development or freeway has sliced a species' habitat and population in two, we could reunite them to encourage genetic diversity—isolated populations, after all, tend to inbreed. "It's not good enough that managers tell animals where to go," says Wikelski. "Animals should tell us where they need to go, where they want to go. It's the animal-defined corridor that we need."

But not every animal species has benefited from the freedom of having fewer humans around. The generalists among them, like coyotes, rats, and wild boar, may comfortably move about city streets, taking any food they can. But there's nothing for a mountain lion in downtown San Francisco—its prey, like deer, remain in the hilly regions to the south of the city.

The Covid-19 lockdown could even be catastrophic for some endangered species. In Africa, iconic species like the rhino rely on protected areas and armed guards, all funded by tourism money that's evaporated and may not fully return for two years. "That becomes a real issue in terms of guards being there—both being allowed to be there with social distancing, but also in terms of them getting paid to do the work," says James Fitzsimons, the Nature Conservancy's director of conservation in Australia, who wasn't involved in the new anthropause article. "So many of the wildlife parks in Africa rely on that tourism dollar to subsidize, or indeed sustain them."

Some islands, too, require constant upkeep to protect native species, campaigns that have now halted. On Gough Island in the South Atlantic, for instance, invasive mice have been eating seabird chicks alive, killing over 2 million birds a year. An eradication effort is now on pause, with untold consequences for those native avians.

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And when it comes to wildlife data, the pandemic giveth and the pandemic taketh away. Australia is emerging from an apocalyptic wildfire season, which saw the virtual obliteration of some of the continent's ecosystems. "A lot of species have been impacted hard, and threatened spaces have lost the majority of their habitat," says Fitzsimons. "One of the key responses was, of course, to be monitoring the recovery of those species, going out and surveying where populations are. A lot of that has been severely hindered by Covid-19, the social distancing and the restrictions on travel that have gone with that."

Humans meddling with habitats during the pandemic is also imperiling some species. Emboldened by suddenly lax enforcement, loggers have been plundering forests: Between late March and early May, Tunisian officials recorded 10 times the number of forest violations compared with the same period last year. Conservationists are concerned that matters will only get worse, as nations slash their environmental budgets in the coming years to recover from the economic toll of the pandemic.

Still, the anthropause has afforded scientists an unprecedented opportunity to study animal behavior. And they're getting a little help from their friends: We the citizen scientists. This spring, the annual City Nature Challenge, organized by the California Academy of Sciences and the Natural History Museum of Los Angeles County, asked urbanites to document biodiversity in their backyards and neighborhoods by taking photos and uploading them to the iNaturalist app. Over 40,000 citizen scientists tallied 815,000 wildlife observations. (Researchers from the Los Angeles museum also recently announced that during the lockdown they'd discovered nine new insect species collected via backyard traps, thanks to another citizen science project called BioSCAN).

The idea is to get people to connect with nature, especially in the long days of sheltering in place. "But that next step is using these data for science and for conservation, and for planning and management," says Rebecca Johnson, codirector of citizen science at the Cal Academy. "All of the data are open and freely available for anyone to use." By monitoring wildlife with iNaturalist, you too could provide scientists with unprecedented insight during the anthropause.

"It really was kind of an emotional thing," Johnson says, "because you knew that people were all doing this together, even while we were apart."

wired.com, 29 June 2020

<https://www.wired.com>

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How the Coronavirus recovery is changing cities

2020-06-22

If one thing is certain, it's that our definition of normal has changed. After months in lockdown to prevent the spread of the coronavirus, cities are reopening — some with masks and social distance, others with still growing numbers of infection. It's unclear what cities will look like in a year or more, but in many areas the landscape is already starting to shift.

Bloomberg CityLab has compiled and illustrated some of the most noteworthy changes that are already happening in communities around the world. From temporarily widened sidewalks to larger patios for socially distanced restaurants, these changes will transform the urban streetscapes of at least some communities. And not all of the shifts will be by intentional design.

With everybody spread further apart, the crux of many of these changes is space. Most people will need more of it, posing one of the great design challenges of the period for already built-up, congested cities. There will be a premium placed on repurposing outdoor space so that more gathering activities can take place in the open air. "We will need to transform the link between indoors and outdoors, to reshape streets as the prolongation of indoor areas," says Carlos Moreno, professor of territorial entrepreneurship and innovation at IAE Sorbonne and adviser to the city of Paris.

To be sure, some communities may be defined by little change at all. If a vaccine becomes widely available, we may see much of the before environment return — but some cities are seizing this as an opportunity to invest in much needed infrastructure. And the recent U.S. protests against racism are fueling other policy changes across American cities.

Even in the most resistant places, there are some almost-ubiquitous changes that are built to be low-tech and easily removed: paint stripes on the sidewalk as a social distancing guideline, and hand sanitizer dispensers outside stores. "We won't need to create new infrastructures," says Moreno. It's more about using existing ones more effectively.

Fewer Riders at Rush Hour

Before coronavirus, high-capacity transit systems made the basic math of dense urban populations work: It would not be possible to move through streets of cities like New York, London, Tokyo, and Mexico City if their millions of daily transit riders took to cars instead. Subways and buses

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were the lifeblood of those urban economies. Coronavirus now casts that role in a troubling light. Standing in crowded spaces for prolonged periods of time, whether on a subway platform or on a long commute by bus or train, could expose riders to the deadly disease. While few cases around the world have been linked to transit thus far — [two separate studies of infection clusters in France and Austria](#) failed to trace a single case to a shared commute — emerging survey results suggest many riders will try to opt for other modes.

During the pandemic, transit agencies around the world saw ridership decline by as much as 92% as many workers stayed home or found other ways to get to work; some set up signs and cordons instructing the remaining riders where to sit and stand in order to maintain social distancing. Several cities enacted mask requirements for passengers and did away with fares on buses so that passengers could reduce contact; others, like Boston, are hastening upgrades to contactless fare payment systems to do away with hand-to-hand transactions entirely. Cities like New York have also ordered rider capacity limits on transit vehicles, while others such as Milan are hoping to stagger commuters over the course of the day. It remains to be seen how these protocols will be enforced.

Even less certain is when, or whether, transit ridership [is likely to return to its previous levels](#). With white-collar commuters potentially continuing to work from home or picking up bikes or car keys instead, the people riding transit for the foreseeable future are likely to be poorer than the average urban resident. They could be in for a bumpy ride with service cuts and potentially more crowding if agencies can't overcome budget shortfalls from gutted ridership. "If you don't have that big load of people moving at the same time, transit becomes really expensive and not a very effective way to move people," said Brian Taylor, a professor at the Institute of Transportation Studies at the University of California, Los Angeles. In heavily transit-reliant cities like New York City and London, route reductions and slower frequencies would impact people of color the most, since they are generally less likely to own cars or hold jobs that allow work from home. And switching to fare payment systems based on credit cards or smartphones could present a barrier to unbanked and under-banked people who, again, may be more reliant on transit than the average citizen.

But transit lovers shouldn't give up hope, for not every bus is bound to be ghosted. The environmental and congestion-relieving effects of these systems is still clear to riders and voters, even in cities that haven't been so reliant on transit historically. In May, voters in Cincinnati approved a sales tax bump to pay for transit improvements, the first time in nearly 50 years

It's unclear what cities will look like in a year or more, but in many areas the landscape is already starting to shift.

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locals had given the green light to any transit-oriented tax. And in the few parts of the world that have essentially stamped out new coronavirus infections, such as Taipei and Auckland, transit ridership is swinging back toward what it used to be.

More Deliveries, More Essential Workers

Delivery drivers, grocery store clerks, health care workers, and transportation operators have long been doing the essential work of keeping people fed, housed, healthy and moving, but Google search trends data show that the term “essential workers” was barely used until the start of March. Now, with the weight of a locked-down society on their shoulders, it’s impossible to ignore their contributions — though recognition hasn’t immediately translated into labor rights and protections. Allegations of protective equipment shortages, inconsistent testing, whistleblower retaliation, and wage theft have been levied at companies employing this workforce; among gig economy workers, the public health implications of low pay and nonexistent benefits have become increasingly apparent.

At first, it felt like the only thing unifying these workers was the danger they were put under, said Katie Wells, a postdoctoral fellow at Georgetown University’s Kalmanovitz Initiative for Labor and the Working Poor. By deeming them essential, “it lays the ground for their sacrifice,” she said. “That being said, there is a silver lining, and a possibility, and a ray of hope: that people will identify with the idea that these workers deserve something more than applause.”

Indeed, the coronavirus pandemic is also fueling a long-simmering workers’ rights movement among lower-wage workforces. Isolated strikes and nationwide walkouts have flared at Amazon warehouses, Trader Joe’s and Whole Foods grocery stores, and among Instacart and Target delivery workers. Old legislation designed to protect gig workers from exploitation is growing teeth: After ride-hail and delivery companies spent months avoiding compliance with a California bill that would grant gig drivers full employment rights and benefits, a coalition of California city attorneys and the state’s attorney general are trying to sue [Uber](#) and [Lyft](#) into submission. And entirely new protections may emerge: Senator Elizabeth Warren and Congressman Ro Khanna have [introduced a package](#) that includes affordable health care and child care, and pay premiums for essential workers. At the city level, New York City lawmakers are championing a local Essential Workers Bill of Rights that would protect

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whistleblowing health care workers from retaliation and grant sick leave to independent contractors.

“We’re going to need economic innovations through this pandemic and on the other side of this pandemic, and things are going to evolve,” said New York City councilmember Brad Lander, who co-introduced the proposed legislation. “It would be nice if that didn’t come along with making it harder for the workers to survive?”

Everything Al Fresco

To bring restaurants, cafes and bars back online, owners face a steep challenge: How can they accommodate the number of customers they need to serve in order to meet razor-thin margins while also guaranteeing a safe and socially distanced experience?

The solution is to grow — to literally increase the size of restaurants in order to put more space between tables. In the cities and states where restaurants have reopened so far, owners have looked to [expand their dining area by claiming the outdoors for more seating](#). What little scientists know about the pandemic suggests that coronavirus transmission is more likely to happen indoors, especially in sealed environments. Moving restaurants into outdoor “[streeteries](#)” means a dining experience that is socially distanced and likely less risky.

That’s why establishments with porches and patios were at the front of the line when it came to reopening. Many cities, like Paris and New York, have closed traffic along commercial corridors to drivers in order to give restaurants the space to spread out. With fewer drivers on the road and people itching for more options for spending time outside, open-air food courts are a no-brainer.

Al fresco dining presents some logistical challenges for the service industry. Tradeoffs emerge by geography: Restaurants in southern climates are more likely to have the parking lots and patios where business can expand, but they also suffer from scorching heat that may put diners off. In other areas, the weather might be amenable to patio dining all summer long, but vacant lots or under-used streets are harder to come by.

Additionally, rainy weather can’t be discounted as a factor that could easily wreck projections for whole weeks out of any given month, and even a sunny brunch atmosphere doesn’t very well suit the likes of dive bars and sports pubs. A resolution can’t come fast enough, but between take-out

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service and patio dining, restaurants may have the tools they need to get by until a vaccine arrives.

Rat Wars

From deer in Tokyo to foxes in London, urban wildlife took advantage of the lockdown orders to explore their empty cities. But not all sightings are welcome, as empty garbage bins and the lack of scraps outside eateries also sent hungry rats flooding into the streets looking for food in the early days of the pandemic. Eventually, their noses will send them straight to residential neighborhoods.

People have already reported rat infestations — and roaches — in their backyards and gardens, near garbage cans and even inside their kitchens. “You can expect rats to start showing up in places where there weren’t any before because plenty of them will start moving to look for food, just like any mammal,” says rodentologist Bobby Corrigan. Some populations that thrived in commercial centers are taking a hit as the scarcity disrupts reproduction, and as stronger members cannibalize the young and weak. But many, in survival mode, are becoming bolder and more aggressive, traveling farther from their burrows to areas where they compete (sometimes violently) with existing colonies over food waste generated by families now eating at home.

Meanwhile, pest control professionals tell Corrigan, who consults several cities on rat abatement, they’re seeing fewer rodents in commercial centers. And the meal baits they continue to put out now actually attract the desperate kleptoparasites who take it back to their burrows — whereas before, the creatures ignored them in favor of food scraps. The two observations drive home a crucial point in the urban fight against rats, Corrigan says: If cities have better measures in place to keep rats from accessing trash, then exterminators can actually control the vermin population.

As restaurants begin to reopen, Corrigan says cities should rethink their waste management infrastructure — this time with rat control at the forefront of their strategy. The rats may start returning to commercial centers, though he can’t say for sure how soon and how vigorously. That will vary block by block, he says, adding that the rats that stayed in their territories or close by may return fairly quickly — and reproduce rapidly — while others that ventured farther away may not come back until the food is abundant again.

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“We don’t know with certainty how each individual rat colony has ‘changed,’” he says, “But in general, if a neighborhood had rats prior to the Covid-19 shutdown, and we humans resume the same food refuse practices that we were using, it is a very good bet the rats will be back sooner or later.”

Parking Lots Are the New Parks

Parking lots. Golf courses. Cemeteries. Busy streets. If it’s open-air and empty, people are probably trying to gather there, as evidence grows that coronavirus is less likely to spread aggressively in outdoor space and the public health threat of police brutality and racism galvanizes masses of protesters.

What makes a park a park? Cities are starting to expand that definition, macgyvering public recreation areas out of unexpected acreage. Some of the best candidates are parking lots, where spaces outnumber the nation’s cars at least 3 to 1, and demand reportedly dropped 90% in just the first month of the pandemic, according to the parking app SpotHero. Paired with burgeoning Slow Streets movements, once-busy intersections could become sites of outdoor play as well as routes for safe commutes. Asima Jansveld, vice president of the High Line Network, says members are partnering with restaurants and bars to encourage al fresco dining.

Meanwhile cemeteries, which inspired the 19th century parks movement, will return as “places to comfort the living as well as honor the dead,” said Liz Vizza, the Executive Director of Boston’s Friends of the Public Garden. “We often say that parks are not amenities, they are a necessity,” she said. “This has put it into stark relief.”

But even as the mental and physical benefits of green space grow clearer, coronavirus could leave park budgets thinner: Proposed cuts in New York City would reduce funding for park maintenance by millions; in California, the governor plans to spend just a fraction of what was once planned to open a new state park. When the National Recreation and Park Association surveyed more than 300 park commissioners about their spending, many had already instituted hiring freezes or laid off part-time and seasonal staff, and half had been asked to cut their budget by as much as 20%.

As they push for more spending, Jansveld says parks advocates should prioritize underserved corners: 100 million people in the U.S. have to walk farther than 10 minutes to find a park, and facilities are unevenly maintained across racial and class lines. And even where they’re plentiful, green respites won’t be enjoyed equally by Black Americans so long as

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they are viewed as threatening, or, at best, with suspicion in public spaces. Recent killings by police have only reinforced this notion.

Seeing a Show ... From Home

In the era of social distancing, theaters and concert venues will have to become more flexible. Filling rows of seats with spectators won't be possible, and packing venues tightly with people for music shows even less so. Live-streaming of drama and music will be ever more common — something that has already begun in earnest with online DJ marathons — like the ever-popular #verzuz series — and live concerts on social media. Meanwhile, theatrical experiences may migrate out of standard venues into spaces such as parks or parking structures, where larger audiences have space to spread out as they watch — something that has already begun for movie-goers with the current resurrection of drive-in movie theatres. Many major motion pictures will skip large-screen theaters altogether and instead head straight to homes via streaming services such as Netflix and Apple TV.

These conditions could propel an upswing in creativity, but traditional venues staging live performances will face challenges. Limiting their audience size to maintain social distancing may make a sector often operating on a shoestring financially unviable, and only heavily subsidized venues will be able to survive with thinned-out audiences. Time-slot theatre, in which small, socially distanced audiences attend shorter performances, staged and restaged as a form of performance marathon, may be an option that keeps venues functioning for their original purpose. However, many venues may need to find alternative uses until close social contact is again safe.

Some are already doing so. In Britain, box office staff at Inverness' Eden Court Theatre have taken on an interim role running a local Covid-19 helpline. A London theater company working with vulnerable women, meanwhile, is now exploring plans to repurpose its space as a refuge. This kind of creative re-use might keep cities' cultural infrastructure in place for when the clouds part, but may mean that in the medium term, theaters don't bear much resemblance to their pre-pandemic selves. As Rufus Norris, director of Britain's National Theatre wrote to other practitioners in the theatrical publication The Stage: "More than ever, we need to explore everything from the perspective of what we can do, not what we used to do."

Recycling Retail

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Coronavirus is likely to hit stores hard. Even when lockdowns end, many customers may have less to spend than before the pandemic and be far more wary of public places. Even in Germany — which reopened shops with a floorspace of less than 800 square meters (8,611 square feet) in mid-April and has thus had a shorter retail hiatus than most — the German Trade Association expects 50,000 bankruptcies of retailers.

Businesses, and the premises they use, are still finding ways to adapt. Since lockdowns began, many smaller stores have started local home deliveries, feeding a skyrocketing demand by using their shopfront locations more as distribution centers than destinations for customers. Stores — and not just food and convenience stores — may also open later, a timetable already being encouraged by the mayor of Milan — so that customers can visit without crowding or waiting in line. Meanwhile, many major retail stores may remain popular with customers who come not to browse, but to pick up orders made online, saving themselves both prolonged contact with other people and time waiting for package deliveries.

Empty units may find other uses, as community hubs and social centers — a process already underway in many places to counterbalance longstanding retail blight. In the U.K., vacant units on or near rundown high streets are already being retooled (with part-public funding) as spaces for artists, micro-entrepreneurs and community groups, creating an attractive atmosphere that boosts customers to other businesses nearby. In some cities, versions of these social centers might emerge informally (and more controversially) in former stores as squats, a process that in 1990s Berlin helped fast-track the restoration of rundown neighborhoods. This kind of community takeover could sow the seeds for a steady recovery. As Vidhya Alakeson, chief executive of community business development trust Power to Change told CityLab. «There's a really good track record of community organizations animating empty space. They're really good at taking on disused properties, carrying out refurbishments to make a building workable again then creating activities to draw people in. Indeed, they will be critical in not allowing town centers to have that sense of permanent decline.»

The Home Office, School, Gym and Day Care

In the early days of the coronavirus crisis, the public health strategy was simple: Stay home, whenever you could. Work from home, school your children from home, cook your own meals at home, exercise at home. Even for essential workers, who by necessity ventured out each day, the home became a locus. And even as states and countries begin to open up,

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the importance of housing — and the precarity of keeping it — will only become more stark.

The closing of offices, schools, and thousands of child care centers — with few daycare alternatives — has had several families struggling to juggle work and the demanding task of parenthood. Making the task even more challenging is the digital divide, in which some 15% of families with school-aged children lack broadband access, according to a Pew survey, and many more are without enough computers for the entire family. Combine that with insufficient lesson plans put together by teachers with no remote-learning experience, and America's existing homework gap has only widened as underserved students are left further behind.

In the foreseeable future, families may have to continue to navigate these challenges as schools and offices are expected to be among the last to reopen. A recent [USA Today/Ipsos survey](#) suggested that 1 in 5 teachers are unlikely to return to the classroom in the fall, while 6 in 10 parents with K-12 children are seeking home-schooling options.

Phasing back into the white-collar workplace will be slow. Those who do return to the office — by choice or by force — will likely find themselves navigating a [transformed office environment](#). (Fewer elbow-to-elbow benches, more ventilation, hand sanitizing stations, and a continued dependence on Zoom.) Some companies are already giving staff the option to work remotely for the rest of the year, allowing those who live in pricey cities to dream of cheaper pastures. (It's too soon to tell whether those dreams will materialize.)

Remote workers are not the only ones who may find themselves in a different place than where they started the pandemic. Hordes of young people, ejected from college with few plans or stalled from pursuing burgeoning careers, have [moved home with their parents](#). And unemployed, underemployed and low-income renters may struggle to keep roofs over their head as emergency eviction moratoria expire. (Some cities, like San Francisco, [have made it permanently illegal](#) to evict a tenant for missing rent due to coronavirus-related income interruptions, while other jurisdictions are bracing [for a tidal wave of eviction filings](#) come summer.)

These moves, along with other changes like shifts in our food distribution system, could add up to a new overall direction for urban planning and design: a hyper-local model, where people access everything they need as near as possible to where they live. "A lot of us speculate that we may be seeing the emergence of [the 15-minute-city](#)," says Phillip Rode, executive

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director of LSE Cities, the urban research center of the London School of Economics, "where because of the importance of non-motorized transport as a safe means to get around, you will have to ensure that the facilities for your daily life — and also maybe your job — are closer to home."

Groceries at a Distance

After having dealt with a frenzy of panic buying, grocery stores are facing a long-term challenge: How to protect employees and customers from contracting a virus that seems to be here to stay, and can be [transmitted by touching](#) contaminated surfaces or breathing in infected droplets. And it is no easy feat.

Most stores have adopted the use of plastic sheets to separate cashiers from customers checking out. Some use one-way aisles to control the flow of clients, and try to limit the number of customers who shop inside the store at once. In Seattle, supermarkets [QFC](#) and [Fred Meyer](#) have been reported as using sensors to detect when a store is nearly half-full so that customers and workers can maintain a social distance. Everywhere, lines of shoppers standing six feet apart have become common-sight, sometimes aided by stickers on the ground.

The most dramatic shift from the pandemic may be an accelerated shift to online grocery shopping. Multiple grocers have increased available home delivery slots; Tesco, the leading supermarket chain in the U.K., has doubled them, according to an email from its public relations team. Curbside pickup — where customers shop online, drive to the store, and have a worker load their purchases into the trunk — is also gaining traction.

The U.S. has been slower to adopt online grocery shopping — it accounted for 3% of total grocery spending in 2019 — compared with South Korea or the U.K., where 10% to 15% of [purchases were made online](#). Gordon Haskett Research Advisors [found in a survey](#) in March that 41% of online shoppers were buying grocery online for the first time — and out of those "newbies," 58% ordered through Walmart.com. At Sainsbury's, the U.K.'s second-largest supermarket chain, there's been an unprecedented growth in demand for home grocery deliveries. "We're also seeing customers embracing technologies in our stores," Sophie Praill, a spokesperson for Sainsbury's, said in an email. "As more customers use this technology and get comfortable with it, we expect to see these figures grow."

Empty Hotels and More Homeless

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With global tourism reeling from the coronavirus pandemic, hotels have recorded near-catastrophic drops in bookings across the country. Demand has cratered around the U.S., and there are no plans in most places to resume the circuit of conferences, weddings, sports matches, festivals, and concerts that keep reservations on the books.

That doesn't mean that nobody needs hotel rooms, however. Early into the pandemic, homeless shelters emerged as hotspots for coronavirus transmission, right up there with prisons and meat-processing plants. Using city, state, and federal resources, California moved quickly to relocate people experiencing homelessness into hotel rooms in hopes of staving off a crisis in places such as Skid Row in Los Angeles and the Tenderloin in San Francisco.

Low-cost motel rooms have served as shelter alternatives in different U.S. cities for years. The national movement around Housing First — a philosophy that seeks to provide people with shelter before treating other chronic problems, such as addiction, joblessness, or mental health disorders — often starts with a conversion of low-cost motels into subsidized housing for people suffering from chronic homelessness. Conversions have their drawbacks, as motels are often located far from the amenities that families need, while hotels have neighbors who will strongly object to living near people experiencing homelessness. High costs are another limiting factor for hotel shelters.

Any port in a storm, as the saying goes: That applies to both hotel owners facing an implosion in demand as well as shelter operators looking at soaring coronavirus infection rates. Governors and mayors in other parts of the U.S. are looking to California's experience as a model for potential quarantine solutions. The pandemic hasn't put an end to sleeping outdoors in either Skid Row or the Tenderloin (or beyond California), and it seems unlikely that Covid-19 will be the thing to push leaders to find the resources to end homelessness. So help will still be in dire need.

In fact, if anything, homelessness could explode in the U.S. as the nation recovers from the pandemic. The federal expansion of unemployment benefits, which has likely helped millions of families stay in their homes, will expire in July. So does a federal restriction on certain evictions. Housing experts see a cliff later this year that could send millions of tenants over the edge.

If the worst comes to pass, then the tent encampments that have emerged as semi-permanent features in urban parks since the last recession could grow a lot more permanent. Just before the pandemic struck, the

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Trump administration was inching toward efforts to try to remove tent encampments (or rather to require cities and states to do this work). Instead, the government's response to the pandemic could lead to growing encampment populations — perhaps even new tent cities.

Reconfigured Streets

That people feel safe stepping into a stream of strangers is one of the marvels of urban street life. Jane Jacobs, famed urbanist and activist, theorized that the repetition of "sidewalk contact" — a request for directions, an appreciation of someone's dog, a shared glance towards some nearby spectacle — builds up a requisite sense of trust over time. When streets no longer support that kind of organic social exposure — such as the heavily congested, auto-oriented streets of so many modern cities — that trust erodes, she wrote.

But not all proximity breeds trust. People of color, and especially Black people in the U.S., are far more likely to be stopped by police and to be policed in general than other racial groups, a concern that has plagued other types of traffic safety policies. For these communities, stop-and-frisk has given "sidewalk contact" a much more nefarious meaning. And now that everyone must be also wary of catching a deadly virus while mingling among crowds, what might be in store for the future of streets?

During the pandemic, urban planners around the world have been in a process of re-examining how street space is allocated, with trust and safety in mind. For example, dozens of cities restricted vehicle access to create new pedestrian corridors and bike lanes along certain streets as an emergency measure during lockdown. The hope was to make space for outdoor recreation at appropriate distances from others, as well as to ease essential travel by means other than the car.

Now, as cities brace for a surge in vehicle congestion, tailpipe pollution, and traffic fatalities as travelers head back to work but stay off public transit, some are moving to make these and other changes permanent. For example, super-congested Bogota, Colombia will keep the 80 kilometers of "emergency" bike lanes it announced at the start of the pandemic for good, and also plans to lower speed limits citywide. London is cordoning off a huge swath of its downtown from cars. Officials in Berlin, where some 43% of households own no car, have said that most of its 14 miles of "pop-up lanes" will stay. Seattle will keep in place 20 miles of its pedestrian-centric "Safe Healthy Streets," which are residential blocks closed to through-traffic by cars but still accessible to locals; these followed a model

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set forth by Oakland, California, which announced 74 miles of similar “slow streets” on an emergency basis in April.

“We’re turning these streets into the equivalent of suburban parking lots,” said Ryan Russo, the director of the Oakland department of transportation, painting an image of slow-moving cars and free-flowing humans.

So with social distancing the state of affairs for the foreseeable future, will the streets of the future be fewer lanes for cars, and wider berths for bikes, wheelchairs, strollers, and feet? Perhaps, but not everyone is rooting for that: Indeed, some Oaklanders have complained that the city bypassed normal public consultation procedures for its slow streets program and worry that these spaces could be enforced unfairly. The anti-racist protests that have seized the world’s cities in the wake of George Floyd’s death under the knee of a Minneapolis police officer show that creating truly safe streets for all will require much deeper change; demonstrator cries to abolish police departments and invest in social services offers one vision that some cities are signaling they will pursue. Whose streets? Our streets.

[bloomberg.com](https://www.bloomberg.com), 22 June 2020

<https://www.bloomberg.com>

SEAC supports ECHA’s RAC proposal on internationally added microplastics use

2020-06-23

ECHA’s Committee for Risk Assessment (RAC) supports restricting the use of intentionally added microplastics while recommending more stringent criteria for biodegradable polymers. The Committee for Socio-economic Analysis (SEAC) agreed on its draft opinion, which will soon be available for consultation.

Reduce Microplastics Release to Environment

RAC has adopted its opinion on [ECHA’s proposal to restrict the use of microplastics](#) that are intentionally added to products on the EU/EEA market, in concentrations of more than 0.01 percent weight by weight. The proposal was considered appropriate for reducing releases to the environment.

In its opinion, the committee recommended the following:

Biodegradable polymers: ECHA’s proposal set out specific test methods

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and pass criteria for identifying biodegradable polymers, which are excluded from the restriction. RAC wanted to see greater evidence that microplastics are biodegradable in the environment.

- **Use of microplastics as infill material on artificial turf pitches:** RAC recommended a complete ban after a transition period of six years as there was incomplete information on the effectiveness of risk management measures. A ban would also be more effective than risk management measures in preventing environmental releases in the long term.
- **The definition of ‘a microplastic’:** ECHA proposed a lower size limit of 100 nanometres for a microplastic as analytical methods for detecting microplastics in products (i.e. mixtures) are still in development. RAC recommended that a lower size limit is not necessary as the potential restriction can also be enforced in other ways, such as by looking at raw materials in supply chains.

SEAC Supports the Wide Scope of Proposal

ECHA’s Committee for Socio-economic Analysis (SEAC) agreed on its draft opinion on the costs and benefits of this proposal for society. SEAC supports the wide scope of the proposal and the transition periods for different product groups to give companies time to prepare. The committee noted that microplastic pollution is irreversible and early action to reduce emissions can be beneficial for society.

A 60-day consultation of SEAC’s draft opinion will start soon. The consolidated opinion of both committees is expected to be ready by the end of 2020. The decisions on REACH restrictions are taken in the European Commission by the EU Member States and scrutinized by the Council and the European Parliament.

[cosmetics.specialchem.com](https://www.cosmetics.specialchem.com), 23 June 2020

<https://www.cosmetics.specialchem.com>

When dikes burst, salt marshes might lessen deadly flooding

2020-06-29

On 25 December 1717, a massive storm blew into the Netherlands. Powerful waves eroded the dikes that kept back the North Sea and an

But although evidence from wave machines and computer simulations supports that idea, there is less evidence from field studies, especially on a large scale.

The proposal was considered appropriate for reducing releases to the environment.

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estimated 14,000 people drowned. After the flooding subsided, engineers took stock of the damage. Now, an analysis of the breaches combined with assessments from another deadly flood in 1953 show that salt marshes can protect dikes during storms—and how they may reduce flooding if the dikes fail.

The results are “really relevant” for communities below sea level, says Michael Beck, a University of California, Santa Cruz, marine scientist who studies coastal resilience, but was not involved in the new work.

It’s well known that salt marshes and other coastal wetlands dampen incoming waves. So it makes sense that vegetation along dikes or other coastal structures could prevent storm damage. But although evidence from wave machines and computer simulations supports that idea, there is less evidence from field studies, especially on a large scale.

Dikes are typically built out of sand, which is covered with compacted clay and stone to help the surface resist waves. The danger is that strong waves will climb up the slope of the dike, causing erosion on the backside. As water pours through new crevices, they widen and deepen. “If you get that, then you run the risk of a breach,” says Tjeerd Bouma, a coastal ecologist at the Royal Netherlands Institute for Sea Research, who helped lead the project.

To get the big picture, the team examined a historic map of damage inflicted by the 1717 storm. Dikes located behind larger salt marshes had fewer and smaller breaches, they report today in *Nature Sustainability*. Dikes sheltered by salt marshes more than 700 meters wide only had 1.2 breaches per kilometer, compared with six breaches per kilometer for dikes behind salt marshes that were less than 200 meters wide. To make sure the salt marsh was the key factor in reducing wave height, the team needed to confirm that the marshes had been hit by equally strong waves. So they used a computer model, which factored in water depth and the shapes of sand bars on another old map, to reconstruct the storm waves. Their assumption appeared justified.

A more recent event provided additional details on dike failures. A large storm that hit in January 1953 caused dikes to burst in 520 places, killing 1836 people. Reviewing extensive reports on the failures, Bouma and colleagues discovered that salt marshes lessened damage to the dikes. And because salt marshes are higher than sea level, they should reduce the amount of water that enters through a breached dike, compared with breached dikes built on mudflats, which are lower than sea level, the researchers found. “That’s a very interesting and novel conclusion,” says

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Richard Luettich, a storm modeler at the University of North Carolina, Chapel Hill, who was not involved in the research. “It seems well founded.”

The stakes are high. “If we had had more marshes, we would have had much more evacuation time, lower water levels, so less damage and less fatalities,” Bouma says. He and colleagues plan to test these predictions with an experimental breach of a dike, which was built on land that has since been converted into a salt marsh.

Meanwhile, the researchers say the coast could be better defended by creating more salt marshes. To prevent their erosion, these marshes could be established on the landward side of an existing dike by building a second dike farther back. As plants grow and collect sediment brought in by ocean tides, the marsh would build up, and the rising land would keep pace with rising sea level. Then, if the first dike fails, the higher land created by the salt marsh would reduce the risk of flooding.

[sciencemag.org](https://www.sciencemag.org), 29 June 2020

<https://www.sciencemag.org>

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