

Bulletin Board

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CONTACT US

subscribers@chemwatch.net
tel +61 3 9572 4700
fax +61 3 9572 4777

1227 Glen Huntly Rd
Glen Huntly
Victoria 3163 Australia

*** While Chemwatch has taken all efforts to ensure the accuracy of information in this publication, it is not intended to be comprehensive or to render advice. Websites rendered are subject to change.**

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ASIA PACIFIC

NEARLY 100 MILLION PEOPLE IN CHINA SUPPLIED TOXIC DRINKING WATER

2020-01-17

Nearly 100 million people have been supplied with drinking water containing unsafe levels of toxic chemicals.

A team from Tsinghua University has observed the levels of per- and polyfluoroalkyls (PFAS) that are man-made chemicals used in fabrics and pesticides, by using data from previous studies, reported South China Morning Post (SCMP).

The study found that the concentration of PFAS in more than 20 per cent of the studied Chinese cities exceeded safe levels.

Since China has no national safety standards, the study used the US state of Vermont's regulations as the benchmark.

The cities with high levels included Wuxi, Hangzhou and Suzhou in eastern China and Foshan in the southern province of Guangdong, according to SCMP.

[Read More](#)

News Live TV, 17 January 2021

<https://newslivetv.com/nearly-100-million-people-in-china-supplied-toxic-drinking-water/>

India Consolidates and Codifies Its National-Level Labour Laws

2020-01-15

INTRODUCTION

India has enacted three new codes on employment conditions, social security and occupational health, safety and working conditions

The Code on Wages was previously enacted in 2019

The codes consolidate, subsume and replace 29 national-level labour laws

The codes introduce several changes to the labour laws and impact both employers and employees

The study found that the concentration of PFAS in more than 20 per cent of the studied Chinese cities exceeded safe levels.

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The codes are yet to be made effective

Draft rules corresponding to each of the 4 codes have been released by Ministry of Labour and Employment for public comments

India, one of the most labour-intensive countries of the world, has finally taken a leap of faith and codified 29 of its national-level labour laws into 4 codes. This is a bold and progressive move given that several labour laws were almost 70-80 years old and enacted largely in the industrial era. Indian economy has changed considerably since, and finally it's time for our labour laws to change. The efforts to codify our labour laws had originally started in early 2000 and finally have seen the light of the day.

The Code on Wages, 2019¹ was notified by the government in 2019. Please see our legal alert [here](#).

The remaining 3 codes, being the Industrial Relations Code, 2020, the Code on Social Security, 2020 and the Occupational Safety, Health and Working Conditions Code, 2020, were enacted on September 29, 2020. The effective date of the codes is yet to be notified in order for them to come into force.

[Read More](#)

National Law Review, 15 January 2021

<https://www.natlawreview.com/article/india-consolidates-and-codifies-its-national-level-labour-laws>

AMERICA

Op-ed: How the FDA Ignores the Law When Approving New Chemical Additives to Food

2020-12-28

The U.S. Food and Drug Administration's (FDA) failure on food chemical safety has left consumers at risk of chronic diseases.

The agency is required to review the safety of classes of chemicals rather than individual chemicals. Using the class approach, multiple chemicals adversely affecting the same organ or system (such as the immune, endocrine, or nervous systems) are evaluated together and a safe consumption level is determined for the class. This approach prevents the intentional new or expanded uses of chemical additives that

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increase chronic disease and, when coupled with a systematic review of prior decisions, results in health risk reduction. Instead, the agency has consistently reviewed individual chemicals without regard to the cumulative effect on chronic disease.

In the last 60 years, innovations in processing, preserving, and packaging have made food more affordable, convenient, and available. To accomplish this transformation, industry, with the FDA's approval, has brought thousands of chemicals into the food system, resulting in diets increasingly composed of ultra-processed foods without regard for the cumulative effect of these additives and their long-term chronic health consequences.

When Congress passed the Food Additive Amendment in 1958 in response to a rapidly changing food system and rising public and scientific concerns about the potential health risks of new chemical additives, it included a health-protective requirement: the cumulative effect of chemically and pharmacologically related substances in the diet must be taken into account when assessing the safety of new additives. That means, additives with similar toxic effects, either because they look alike or affect similar body functions, must be evaluated together to prevent exposures above an amount that would cause harm.

However, food manufacturers and regulators have neglected to consider this cumulative effect, failing to harness changes in food technology and use advances in scientific knowledge to protect the public from dietary chemical exposures. Medical associations and a group of health, environmental and consumer organizations [have jointly challenged](#) the FDA to change its practice of not accounting for the cumulative health effect of chemicals in the diet as required by law.

[Read More](#)

EcoWatch, 28 December 2020

<https://www.ecowatch.com/fda-chemicals-food-2649660274.html?rebelltitem=1#rebelltitem1>

Dow Chemical Backs Effort to Use New York City's Drinking Water on Long Island

YYYY-MM-DD

Long Island earned a distinction in 2016 it didn't want: Some of the region's drinking water was found to have among the highest levels

Instead, the agency has consistently reviewed individual chemicals without regard to the cumulative effect on chronic disease.

Years of heavy industry, along with residential waste, has left many concerned about chemicals that have potentially seeped into its aquifer.

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nationwide of 1,4-dioxane, a chemical the U.S. Environmental Protection Agency calls a “likely human carcinogen” but doesn’t regulate.

As a result, New York’s state Department of Health began its own “Operation Warp Speed” to deal with high 1,4-dioxane levels, and approved a treatment system that effectively removes the chemical from the water system, said Paul Granger, the superintendent of the Hicksville Water District, one of about 50 water suppliers on Long Island. Earlier this year, the state—the first in the country to regulate the chemical—set a maximum contaminant level (MCL) in drinking water for the solvent, which can appear in everything from industrial degreasers to laundry detergent.

But one advocacy group is suing to have the area use New York City’s “pristine water supply,” claiming the new treatment system, which costs hundreds of millions of dollars to install and run, isn’t the most efficient way to detox Long Island’s water.

Long Island, unlike New York City, gets its drinking water from a system of hundreds of underground wells. Much of the island also is unsewered, with many residents using septic tanks. Years of heavy industry, along with residential waste, has left many concerned about chemicals that have potentially seeped into its aquifer.

[Read More](#)

The Wall Street Journal, 29 December 2020

<https://www.wsj.com/articles/dow-chemical-backs-effort-to-use-new-york-citys-drinking-water-on-long-island-11609250401>

EPA finalizes historic action to better protect children’s health

YYYY-MM-DD

U.S. Environmental Protection Agency Administrator Andrew Wheeler announced the first major update to the agency’s Lead and Copper Rule (LCR) in nearly 30 years on Dec. 22. This historic action strengthens every aspect of the LCR and accelerates actions that reduce lead in drinking water to better protect children from lead exposure.

“This new Lead and Copper Rule will protect children and families from exposure to lead in drinking water,” said EPA Administrator Andrew Wheeler. “For the first time in nearly 30 years, this action incorporates best practices and strengthens every aspect of the rule, including

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closing loopholes, accelerating the real world pace of lead service line replacement, and ensuring that lead pipes will be replaced in their entirety.”

In older homes and buildings, lead can leach from service lines, solder, and fixtures into tap water and become a significant source of lead exposure. In children, lead exposure can cause irreversible and life-long health effects, including decreasing IQ, focus, and academic achievement.

“This Lead and Copper Rule makes substantive changes to protect children from the dangers of lead exposure,” said EPA Region 7 Administrator Jim Gulliford. “While we have increased community awareness and taken action to reduce childhood lead exposure, getting lead out of our communities’ drinking water supply lines is a momentous step. Each additional step we take in this fight against lead exposure provides a better future for our children and must continue to be a top priority.”

“This new Lead and Copper Rule makes concrete and substantive changes to protect children from the dangers of lead exposure,” said EPA Region 7 Administrator Jim Gulliford. “While we have increased community awareness and action to reduce childhood lead exposure, getting the lead out of our communities’ drinking water supply lines is a momentous step. Each additional step we take in this fight against lead exposure provides a better future for our children and must continue to be a top priority.”

The U.S. has made tremendous progress in lowering children’s blood lead levels by phasing lead out of gasoline, banning lead paint, and implementing the old LCR. However, the old rule included deficiencies that are fixed by EPA’s new Lead and Copper Rule. For example, the old rule created so many loopholes that only 1 percent of utilities actually replaced lead pipes as a result of an action level exceedance. The old LCR also allowed up to 48 months to pass in our small towns before corrosion control was in place after a water system exceeded the action level and failed to require all systems to test for lead in drinking water in their elementary schools or child care facilities.

[Read More](#)

Daily Journal Online, 30 December 2020

https://dailyjournalonline.com/community/democrat-news/epa-finalizes-historic-action-to-better-protect-children-s-health/article_12c99103-7861-5602-9669-c4bc64a2fceb.html

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TEXAS LEGISLATORS EYE TOUGHER RULES ON CHEMICAL TANKS TO PREVENT EXPLOSIONS, SPILLS DURING STORMS

YYYY-MM-DD

Deer Park residents sheltered in place. The Houston Ship Channel shut down. Toxic chemicals spilled during Hurricane Harvey. And just last month, seven people were injured in a Corpus Christi fire.

These are the incidents that some Texas lawmakers have in mind as they push to require new standards on above-ground chemical storage tanks during the upcoming legislative session.

The recent fire in Corpus Christi started at an oil storage tank. Another fire at a leaking tank farm at a petrochemical plant in Deer Park shut down the ship channel in March 2019 and created a huge plume of smoke that could be seen miles away. And during Hurricane Harvey in 2017, flooding caused the explosions at Arkema's chemical power plant and damaged storage tanks that leaked thousands of gallons of gasoline.

Two bills, one from state Rep. Mary Ann Perez, D-Pasadena, and another from Sen. Nathan Johnson, D-Dallas, would task the state's environmental agency with creating tougher rules on the structural integrity of these above-ground tanks at chemical plants, refineries, electric power plants or other large storage facilities.

[Read More](#)

Front Porch News, 6 January 2021

<https://frontporchnewstexas.com/2021/01/06/texas-legislators-eye-tougher-rules-on-chemical-tanks-to-prevent-explosions-spills-during-storms/>

EUROPE

England launches plan to ease crop gene editing regulation post-Brexit

YYYY-MM-DD

England's farming and environment minister George Eustice said on Thursday he was launching a public consultation on gene editing of crops, with the prospect the technology will be regulated less stringently than genetic modification.

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The European Court of Justice ruled in July 2018 that mutagenesis-based gene-editing methods such as CRISPR/Cas9, which can rearrange targeted bits of DNA, fall under rules that now apply to genetic modification via strands of DNA from a different species.

Britain opposed the verdict, which was widely condemned by biotech and chemical industry associations, as well as academic scientists, but drew praise from some environmental and consumer rights groups.

"As an EU member we obviously had no choice but to slavishly adopt and accept the judgments of the ECJ, however irrational and flawed they might be," Eustice told the Oxford Farming Conference.

[Read More](#)

Reuters, 7 January 2021

<https://www.reuters.com/article/britain-farming-genes/england-launches-plan-to-ease-crop-gene-editing-regulation-post-brexit-idUSL1N2JI0RK>

Roadmap for EU FCM policy revision

2020-12-18

EU Commission's DG SANTE publishes Inception Impact Assessment as roadmap for revision of EU regulations on food contact materials; outlines eight main "issues" identified during ongoing evaluation, possible policy options to be considered by planned Impact Assessment; commenting period open until January 29, 2021

On December 18, 2020, the *European Commission's (EC) Directorate General for Health and Food Safety (DG SANTE)* opened a consultation on its inception impact assessment (IIA, which is essentially an extended roadmap) for the ongoing evaluation and revision of EU legislation on food contact materials (FCMs). The consultation is open until January 29, 2021. *DG SANTE* is set to host a webinar to present the roadmap on January 20, 2021.

Background context

In the published IIA document, which can be downloaded from the consultation's webpage, *DG SANTE* summarizes that "the basic provisions of the present EU [FCM] legislation were introduced in 1976 but until recently had never been evaluated." Therefore, in 2018 the ongoing Evaluation of FCM policy legislation was initiated, starting with a first stakeholder workshop (FPF reported), which was followed by a public

The consultation is open until January 29, 2021.

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consultation (FPF [reported](#)) and a second stakeholder workshop (FPF [reported](#)). This still-ongoing evaluation covers both the general FCM framework Regulation (EC) No 1935/2004 as well as several more specific FCM-relevant legislation pieces, such as Regulation (EC) No 10/2011 on plastic FCMs. The evidence and feedback collected by the EC so far have confirmed the existence of “problems that are linked to the absence of specific EU rules, which leads to uncertainty about safety of some FCMs and internal market problems.” Broad support for the need to introduce “further specific EU legislation” was expressed “by all stakeholders including EU Member States, the European Parliament, industry, and non-governmental organizations.” In addition, “several [other] fundamental issues present in the existing approach” were revealed.

Problems intended to be tackled through revising the EU’s FCM legislation

The IIA outlines the following 8 “fundamental issues,” which “relate both to the absence of EU specific measures (1) as well as various aspects of the current EU rules (2-8) as follows”:

1. “Lack of functioning of the internal market and possible safety issues for non-plastics FCMs.” The absence of harmonized EU rules for most FCM types results in “a lack of a defined level of safety and consequently no appropriate legal basis for industry to carry out compliance work.” In addition, difficulties with enforcement and control of imports are highlighted as accompanying challenges.

2. “The positive authorized list approach and lack of focus on the final article.” While some stakeholders view positive authorized lists as “advantageous,” it is also recognized that the use of positive lists can “bring practical problems and limitations” and result in “excessive burdens for public authorities and industry alike.” For example, “the creation of lists causes a significant obstacle to harmonization of rules for other materials such as inks, rubbers and adhesives.” An additional burden comes from the need to “re-evaluate certain substances when new scientific information becomes available.” Furthermore, current FCM assessments which are focused on the starting substances “do not sufficiently address the safety of the final product” and also do not consider “the actual potential use and lifespan of the final article and consequences of the aging of the material.” This approach “puts a disproportionate emphasis on starting substances, leaving the safety of the final material for the supply chain to resolve without clear rules,” DG SANTE concludes.

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[Read More](#)

Food Packaging Forum, 18 December 2020

<https://www.foodpackagingforum.org/news/roadmap-for-eu-fcm-policy-revision>

EFSA: Draft opinion on NMDR open for consultation

2020-12-17

European Food Safety Authority’s (EFSA) draft opinion reviews literature on assessment of non-monotonic dose responses (NMDRs), finds lack of standards for statistical approaches; suggests stepwise approach for ambiguous ‘apparent’ NMDRs; approach applied in two case studies finds no NMDR for bisphenol A (BPA) but does for di(2-ethylhexyl)phthalate (DEHP); open for comments until February 4, 2021

On December 10, 2020 news provider *Chemical Watch* [reported](#) on a draft opinion on non-monotonic dose-response (NMDR) by the *European Food Safety Authority (EFSA)* that is open for [consultation](#) until February 4, 2021.

The draft opinion represents a follow-up to an external *EFSA* [review](#) (FPF [reported](#)) which concluded that “... criteria for evidence of NMDR, evaluation of data and importance for risk assessment had to be further evaluated.”

In their current review, the authors found, among others, that there is a lack of standards for statistical assessment approaches, which may lead to diverging conclusions for risk assessments.

Furthermore, the authors note that when assessing different NMDR studies, for some cases, biological effects clearly indicate an NMDR and therefore are well covered by current risk assessment principles. However, they also observed ambiguous cases with so-called ‘apparent’ NMDR where studies detected only effects at the molecular level, but these could possibly also lead to adverse effects in humans.

For this ‘apparent’ non-monotonicity, the authors suggest a step-wise evaluation approach. The draft opinion suggests, among other recommendations, that further investigation is needed if the effects are present in the whole organism and not supported by further experimental work. It is also important whether or not a mechanistic sequence (e.g. an adverse outcome pathway; AOP) could be partially or fully established. If one has been established, then-current methodologies for risk assessment may need to be reevaluated.

In their current review, the authors found, among others, that there is a lack of standards for statistical assessment approaches, which may lead to diverging conclusions for risk assessments.

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In the draft opinion, this proposed approach has been applied to two case studies on bisphenol A (BPA; CAS 80-05-7) and di(2-ethylhexyl)phthalate (DEHP; CAS 117-81-7). The authors concluded that no indications of NMDR were detected for BPA, while there were indications of a biologically plausible NMDR for DEHP.

EFSA is calling for feedback on their draft opinion. The call for comments will remain open until February 4, 2021.

Read More

Food Packaging Forum, 17 December 2020

<https://www.foodpackagingforum.org/news/efsa-draft-opinion-on-nmdr-open-for-consultation>

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REACH Update

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EU Commission plans EDC hazard classes within CLP

2021-01-05

European Commission announces plan to create new hazard classes for endocrine disrupting chemicals (EDCs) within the EU's Classification, Labeling, and Packaging (CLP) Regulation; industry stakeholders criticize decision, call for addressing EDCs via REACH Regulation; civil society groups welcome change; further discussion planned for February 2021.

On December 17-18, 2020, the *European Commission (EC)* held its second Annual Forum on Endocrine Disruptors as an online event. Featuring speakers from across the *EC's* agencies as well as from national authorities, the *OECD*, and academic researchers, the forum focused on providing an update on the *EC's* work to identify and regulate endocrine disrupting chemicals (EDCs). It featured presentations on testing methods, human biomonitoring, the EU's completed fitness check of its legislation on EDCs (FPF reported), as well as the recently released chemicals strategy for sustainability that specifically aims to address EDCs in food contact materials (FCMs) (FPF reported).

One plan presented by the *EC* during the event that has received significant attention is to create a new set of hazard classes for EDCs under the EU's Classification, Labeling, and Packaging (CLP) Regulation (EC 1272/2008). News provider *Chemical Watch* reports that the treatment of EDCs under the CLP regulation would then mirror that of carcinogens, mutagens, and reprotoxicants (CMRs) regarding the resulting classifications. Separate classes would be introduced for human and environmental health. Cristina de Avila from the *EC's DG Environment* announced that this decision has been made and "the direction is set."

However, this came as a surprise to industry stakeholders that were quick to criticize the plan. Blanca Serrano from chemical industry association *Cefic* commented that her organization was "under the impression that the discussion was still ongoing" and called for a "legal assessment" of the presented plan. Industry stakeholders have also argued that while they are supportive of implementing criteria to identify EDCs, this would be better accomplished within the existing REACH regulation rather than creating new hazard classes within the CLP Regulation. Exactly how to better implement EDCs within REACH has been an ongoing debate among stakeholders within the Competent Authorities for REACH and CLP subgroup on EDs (CASG-ED).

In contrast, civil society organizations have welcomed the plan to introduce the hazard classes under CLP. Natacha Cingotti from the *EDC-*

Cristina de Avila from the EC's DG Environment announced that this decision has been made and "the direction is set."

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free Europe coalition and Health and Environment Alliance (HEAL) said that her organization is “particularly pleased with the plan to introduce hazard classes.” ClientEarth has argued that all sectoral legislation is based on the identification of chemical hazards, which is done explicitly within the CLP regulation.

While DG Environment has reaffirmed that “the political will of the Commission is clear,” stakeholders will have a formal opportunity to discuss the issue during the next scheduled meeting of the CASG-ED in February 2021.

[Read More](#)

Food Packaging Forum, 5 January 2021

<https://www.foodpackagingforum.org/news/eu-commission-plans-edc-hazard-classes-within-clp>

Candidate List updated with two chemicals that are toxic for reproduction

2021-01-19

ECHA/NR/21/05

The Candidate List of substances of very high concern now contains 211 chemicals that may harm people or the environment.

Helsinki, 19 January 2021 – The two substances are used in products, such as inks or toners and to produce plastics and rubber tyres. They were added to the Candidate List as they are toxic for reproduction and therefore, may adversely affect sexual function and fertility, and cause developmental toxicity in offspring.

Companies must follow their legal obligations and ensure the safe use of these chemicals. From January 2021 onwards, they also have to notify ECHA under the Waste Framework Directive if their products contain substances of very high concern. This notification is submitted to ECHA’s SCIP database and the information will later be published on the Agency’s website.

Substances added to the Candidate List on 19 January 2021:

The Candidate List of substances of very high concern now contains 211 chemicals that may harm people or the environment.

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#	Substance name	EC number	CAS number	Reason for inclusion	Examples of use(s)
1	Bis(2-(2-	205-594-7	143-24-8	Toxic for	Solvent/ extraction agent.
2	Diocetyl tin dilaurate, stannane, dioctyl-, bis(coco acyloxy) derivs., and any other stannane, dioctyl-, bis(fatty acyloxy) derivs. wherein	-	-	Toxic for	Not registered under REACH as a group of substances. However, one of the three group members (Diocetyl tin dilaurate) is registered. The mono-constituent form of the substance (dioctyl tin dilaurate) is used as an additive in the production of plastics and rubber tyres.

Corrigendum on 20.1.2021: The following sentence in the table: “Not registered under REACH as a group of substances. However, one of the three group members (Diocetyl tin dilaurate) is registered.” was added, replacing the previous sentence “Not registered under REACH”.

Background

The Candidate List includes substances of very high concern that may have serious effects on our health or the environment. These substances

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may be placed on the Authorisation List in the future, which means that companies would need to apply for permission to continue using them.

Under the REACH Regulation, companies may have legal obligations when their substance is included – either on its own, in mixtures or in articles – in the Candidate List. Any supplier of articles containing a Candidate List substance above a concentration of 0.1 % weight by weight has to give sufficient information to their customers and consumers to allow safe use. Importers and producers of articles containing a Candidate List substance have six months from the date of its inclusion in the list (19 January 2021) to notify ECHA. Suppliers of substances on the Candidate List (supplied either on their own or in mixtures) have to provide their customers with a safety data sheet.

As of 5 January 2021, article suppliers must notify substances of very high concern in their articles to ECHA's SCIP database under the Waste Framework Directive.

More information on these obligations and related tools are available on ECHA's website.

[Read More](#)

ECHA, 19 January 2021

<https://echa.europa.eu/-/candidate-list-updated-with-two-chemicals-that-are-toxic-for-reproduction>

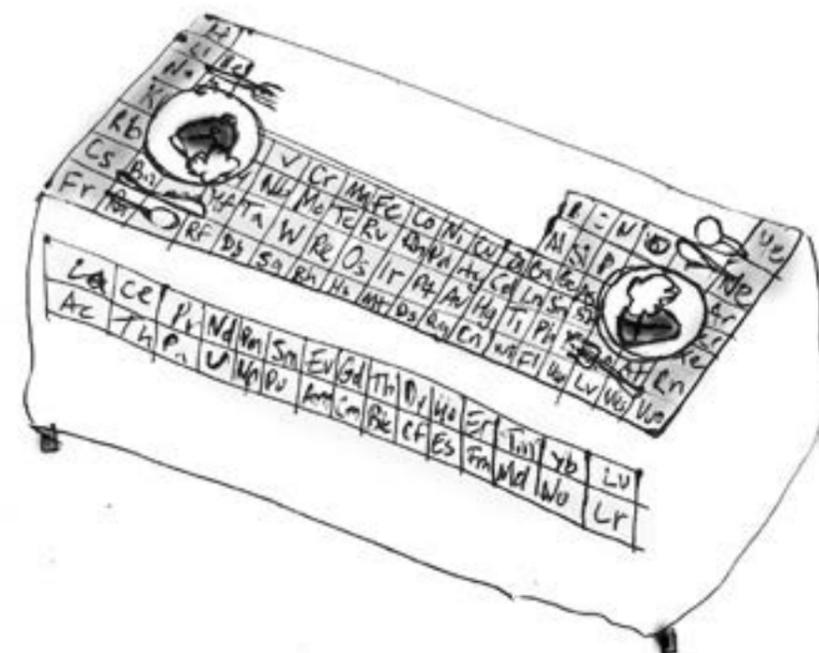
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Janet's Corner

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The Periodic Tablecloth

2021-01-29



"THE PERIODIC TABLECLOTH"
SASSYHANDTURKEY.COM

<https://sassyhandturkey.com/2013/01/04/the-periodic-tablecloth/>

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Hazard Alert

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Hydrogen Peroxide

2021-01-29

Hydrogen peroxide is a chemical compound with the formula H_2O_2 . [1] It is a colourless liquid at room temperature with a bitter taste. Small amounts of gaseous hydrogen peroxide occur naturally in the air. It is unstable, decomposing readily to oxygen and water with release of heat. Although non-flammable, it is a powerful oxidising agent that can cause spontaneous combustion when it comes in contact with organic material. [2]

USES [1]

Industrial

- Hydrogen peroxide is used for pulp- and paper-bleaching.
- It is also used in the manufacture of sodium percarbonate and sodium perborate, which are used as mild bleaches in laundry detergents.
- Hydrogen peroxide is used in the production of various organic peroxides including dibenzoyl peroxide, which are used as a flour bleaching agent and as a treatment for acne.
- Peroxy acids, such as peracetic acid and meta-chloroperoxybenzoic acid are also typically produced using hydrogen peroxide.
- Hydrogen peroxide is used in certain waste-water treatment processes to remove organic impurities.

Medical

Disinfectant

- Hydrogen peroxide can be used for the sterilisation of various surfaces, including surgical tools and may be deployed as a vapour (VHP) for room sterilisation.
- Historically hydrogen peroxide was used for disinfecting wounds. It is now thought to slow healing and lead to scarring because it destroys newly formed skin cells.

Cosmetic applications

- Diluted hydrogen peroxide (between 1.9% and 12%) mixed with ammonium hydroxide is used to bleach human hair.
- Hydrogen peroxide is also used for tooth whitening and can be mixed with baking soda and salt to make a home-made toothpaste.

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- Hydrogen peroxide may be used to treat acne, although benzoyl peroxide is a more common treatment.

Propellant

Hydrogen peroxide is a component of rocket fuel.

Explosives

Hydrogen peroxide has been used for creating organic peroxide-based explosives, such as acetone peroxide, for improvised explosive devices.

Other uses

- Glow sticks: Hydrogen peroxide reacts with certain di-esters, such as phenyl oxalate ester (cyalume), to produce chemiluminescence; this application is most commonly encountered in the form of glow sticks.

Horticulture

Some horticulturalists and users of hydroponics advocate the use of weak hydrogen peroxide solution in watering solutions. Its spontaneous decomposition releases oxygen that enhances a plant's root development and helps to treat root rot (cellular root death due to lack of oxygen) and a variety of other pests.

Fish aeration

Laboratory tests conducted by fish culturists in recent years have demonstrated that common household hydrogen peroxide can be used safely to provide oxygen for small fish. The hydrogen peroxide releases oxygen by decomposition when it is exposed to catalysts such as manganese

SOURCES & ROUTES OF EXPOSURE

Sources of Exposure [2]

- You can be exposed to hydrogen peroxide through its use as a general disinfectant. Hydrogen peroxide solutions used for this purpose are sold at almost all drugstores or supermarkets.
- Because hydrogen peroxide is used in many industries for a variety of purposes, workers in such industries may be exposed to this chemical through inhalation or contact with the skin.

Hydrogen peroxide is a chemical compound with the formula H_2O_2 .

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Routes of Exposure [3]

- Inhalation: Inhalation of vapours, mists, or aerosols from concentrated solutions of hydrogen peroxide can cause significant morbidity. Because it is nearly odourless and non-irritating except at high concentrations, persons may not be aware of its presence.
- Skin/Eye Contact: Hydrogen peroxide is poorly absorbed through intact skin. When used for household disinfectant purposes (3% to 5%), it is mildly irritating to the skin and mucous membranes. At a concentration of 10%, which is found in some hair-bleaching solutions, it is strongly irritating and may be corrosive.
- Ingestion: If ingested, solutions of hydrogen peroxide up to concentrations of 9% are generally nontoxic; however, even a 3% solution is mildly irritating to mucosal tissue and may cause vomiting and diarrhoea. Ingestion of industrial-strength solutions causes systemic toxicity and has been associated with fatalities.

HEALTH EFFECTS [2]

- Hydrogen peroxide can be toxic if ingested, inhaled, or by contact with the skin or eyes.
- Inhalation of household strength hydrogen peroxide (3%) can cause respiratory irritation.
- Exposure to household strength hydrogen peroxide can cause mild ocular irritation.
- Inhalation of vapours from concentrated (higher than 10%) solutions may result in severe pulmonary irritation.
- Ingestion of dilute solutions of hydrogen peroxide may result in vomiting, mild gastrointestinal irritation, gastric distension, and on rare occasions, gastrointestinal erosions or embolism (blockage of blood vessels by air bubbles). Ingestion of solutions of 10-20% strength produces similar symptoms, but exposed tissues may also be burned. Ingestion of even more concentrated solutions, in addition to the above, may also induce rapid loss of consciousness followed by respiratory paralysis.
- Eye exposure to 3% hydrogen peroxide may result in pain and irritation, but severe injury is rare. More concentrated solution may result in ulceration or perforation of the cornea.
- Skin contact can cause irritation and temporary bleaching of the skin and hair. Contact with concentrated solutions may cause severe skin burns with blisters.

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- It is unknown whether hydrogen peroxide affects in humans.

SAFETY [4]

First Aid Measures

- Eye Contact: Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.
- Skin Contact: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.
- Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.
- Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
- Serious Inhalation: Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.
- Ingestion: Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Fire & Explosion Information

- Hydrogen peroxide is non-flammable;
- It is slightly explosive in presence of open flames and sparks, of heat, of organic materials, of metals, of acids.
- Small fires should be extinguished with water. Do not use dry chemicals or foams. CO₂, or Halon may provide limited control.
- Large fires should be extinguished with water from a distance. Move containers from fire area if you can do it without risk. Do not move cargo or vehicle if cargo has been exposed to heat. Fight fire from

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- maximum distance or use unmanned hose holders or monitor nozzles. Cool containers with flooding quantities of water until well after fire is out. ALWAYS stay away from tanks engulfed in fire.
- For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.
 - Hydrogen Peroxide is a strong oxidiser. It is not flammable itself, but it can cause spontaneous combustion of flammable materials and continued support of the combustion because it liberates oxygen as it decomposes.
 - Hydrogen peroxide mixed with magnesium and a trace of magnesium dioxide will ignite immediately.
 - Soluble fuels (acetone, ethanol, glycerol) will detonate on a mixture with peroxide over 30% concentration, the violence increasing with concentration.
 - Explosive with acetic acid, acetic anhydride, acetone, alcohols, carboxylic acids, nitrogen containing bases, As_2S_3 , $Cl_2 + KOH$, FeS , $FeSO_4 + 2$ methylpyridine + H_2SO_4 , nitric acid, potassium permanganate, P_2O_5 , H_2Se , Alcohols + H_2SO_4 , Alcohols + tin chloride, antimony trisulfide, chlorosulfonic acid, aromatic hydrocarbons + trifluoroacetic acid, azeliac acid + sulfuric acid (above 45 C), benzenesulfonic anhydride, tert-butanol + sulfuric acid, hydrazine, Sulfuric acid, Sodium iodate, tetrahydrothiophene, thiodiglycol, mercurous oxide, mercuric oxide, lead dioxide, lead oxide, manganese dioxide, lead sulfide, gallium + HCl, ketenes + nitric acid, Iron (II) sulfate + 2-methylpyridine + sulfuric acid, Iron (II) sulfate + nitric acid, + sodium carboxymethylcellulose (when evaporated), Vinyl acetate, trioxane, water + oxygenated compounds (eg: acetaldehyde, acetic acid, acetone, ethanol, formaldehyde, formic acid, methanol, 2-propanol, propionaldehyde), organic compounds. Beware: Many mixtures of hydrogen peroxide and organic materials may not explode upon contact. However, the resulting combination is detonatable either upon catching fire or by impact.
 - Explosion hazard is severe when highly concentrated or pure hydrogen peroxide is exposed to heat. Mechanical impact or caused to decompose catalytically by metals and their salts, dusts and alkalis.
 - Another source of hydrogen peroxide explosions is from sealing the materials in strong containers.

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Exposure Controls & Personal Protective Equipment

Engineering Controls

- Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapours below their respective threshold limit value.
- Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protective Equipment

The following personal protective equipment is recommended when handling hydrogen peroxide:

- Face shield
- Full suit
- Vapour respirator (be sure to use an approved/certified respirator or equivalent)
- Gloves
- Boots

Personal Protection in Case of a Large Spill:

- Splash goggles
- Full suit
- Vapour respirator
- Boots
- Gloves
- A self-contained breathing apparatus should be used to avoid inhalation of the product.
- Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

REGULATION

United States

OSHA: The Occupational Safety & Health Administration has set the following Permissible Exposure Limits (PEL) for hydrogen peroxide:

- General Industry: 29 CFR 1910.1000 Table Z-1 -- 1 ppm, 1.4 mg/m³ TWA
- Construction Industry: 29 CFR 1926.55 Appendix A -- 1 ppm, 1.4 mg/m³ TWA

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- Maritime: 29 CFR 1915.1000 Table Z-Shipyards -- 1 ppm, 1.4 mg/m³ TWA

ACGIH: The American Conference of Governmental Industrial Hygienists has set a Threshold Limit Value (TLV) for hydrogen peroxide of 1 ppm, 1.4 mg/m³ TWA; Appendix A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans

NIOSH: The National Institute for Occupational Safety and Health has set a Recommended Exposure Limit (REL) for hydrogen peroxide of 1 ppm, 1.4 mg/m³ TWA

Australia

Safe Work Australia: Safe Work Australia has set a Time Weighted Average Concentration (TWA) for hydrogen peroxide of 1 ppm or 1.4 mg/m³ for a 40-hour work week.

REFERENCES

1. https://en.wikipedia.org/wiki/Hydrogen_peroxide
2. <http://www.atsdr.cdc.gov/toxfaqs/tf.asp?id=305&tid=55>
3. <http://www.atsdr.cdc.gov/MMG/MMG.asp?id=304&tid=84>
4. <http://www.sciencelab.com/msds.php?msdsId=9924299>
5. https://www.osha.gov/dts/chemicalsampling/data/CH_246600.html
6. <http://www.safeworkaustralia.gov.au/sites/SWA/about/Publications/Documents/772/Workplace-exposure-standards-airborne-contaminants.pdf>

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Global temperatures in 2020 tied record highs

2021-01-14

Housebound by a pandemic, humanity slowed its emissions of greenhouse gases in 2020. But Earth paid little heed: Temperatures last year tied the modern record, climate scientists reported today. Overall, the planet was about 1.25°C warmer than in preindustrial times, according to jointly reported assessments from NASA, the U.K. Met Office, and other institutions.

The annual update of global surface temperatures—an average of readings from thousands of weather stations and ocean probes—shows 2020 essentially tied records set in 2016. But the years were nothing alike. Temperatures in 2016 were boosted by a strong El Niño, a weather pattern that warms the globe by blocking the rise of cold deep waters in the eastern Pacific Ocean. Last year, however, the Pacific entered La Niña, which has a cooling effect. That La Niña didn't provide more relief is an unwelcome surprise, says Nerilie Abram, a climate scientist at Australian National University. "It makes me worried about how quickly the global warming trend is growing."

The past 6 years are the six warmest on record, but the warming of the atmosphere is unsteady because of its chaotic nature. The ocean, which absorbs more than 90% of the heat from global warming, displays a steadier trend, and here, too, 2020 was a record year. The upper levels of the ocean contained 20 zettajoules (10²¹ joules) more heat than in 2019, and the rise was double the typical annual increase, scientists reported yesterday in *Advances in Atmospheric Sciences*. The subtropical Atlantic Ocean was particularly hot, fueling a record outbreak of hurricanes, says Lijing Cheng, a climate scientist at the Chinese Academy of Sciences's Institute of Atmospheric Physics who led the work.

This heat, monitored down to 2000 meters by a fleet of 4000 robotic probes, is spreading deeper into the ocean while also migrating toward the poles. An extreme heat wave struck the northern Pacific, killing marine life. For the first time, warm Atlantic waters were seen penetrating into the Arctic Ocean, melting sea ice from below and driving its extent nearly to a record low. The warming ocean and melting ice sheets are raising sea levels by 4.8 millimeters per year, and the rate is accelerating.

On land, 2020 was even more relentless, with temperatures rising 1.96°C above preindustrial levels, a clear record, reported Berkeley Earth, one of the monitoring groups. It was the warmest year ever in Asia and Europe and tied for the warmest in South America. Russia was particularly hot,

Overall, the planet was about 1.25°C warmer than in preindustrial times, according to jointly reported assessments from NASA, the U.K. Met Office, and other institutions.

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breaking its previous record by 1.2°C, while swaths of Siberia were 7°C warmer than in preindustrial time, leading to large-scale fires and thawing permafrost that caused buildings to founder and set off oil spills. “Siberia was crazy,” says Zeke Hausfather, a climate scientist at the Breakthrough Institute and co-author of the Berkeley Earth analysis. “That heat would effectively be impossible without the warming we’ve seen.”

In Australia, record-setting heat and drought fueled catastrophic bushfires at the start of 2020. Fires torched nearly one-quarter of southeastern Australia’s forests and destroyed 3000 homes. Climate change was to blame for the country’s “Black Summer,” Abram and co-authors concluded in a study published this month in *Communications Earth & Environment*.

Meanwhile, in the United States, unprecedented heat came to the desert Southwest, which is already warming faster than the rest of the country. Phoenix wilted under its hottest summer ever, averaging 36°C. Arizona’s Maricopa county, home to Phoenix, is a leader in addressing heat exposure, yet its heat deaths have hit a new record each year since 2016. In 2020, the number approached 300, a jump of some 50% over the previous year, says David Hondula, a climatologist who studies heat mortality at Arizona State University, Tempe. “It was just off the charts in terms of heat.”

Although the global economic slowdown of the COVID-19 pandemic cut carbon dioxide (CO₂) emissions by some 7%, atmospheric CO₂ is long-lived, and warming from previous emissions was preordained. In any case, the drop in emissions is unlikely to last. Later this year, in May, before photosynthesis in the Northern Hemisphere draws down CO₂, the U.K. Met Office predicts that levels of atmospheric CO₂ will pass 417 parts per million for several weeks, 50% higher than preindustrial levels. Only dramatic action by the world’s countries, far beyond existing efforts, can begin to halt this build up, Cheng says.

Should the current rate of warming continue, the world will breach the targets set in the Paris climate agreement—limiting warming to 1.5°C or 2°C—by 2035 and 2065, respectively. But Hausfather says it’s quite possible that warming, which has largely held steady for the past few decades at 0.19°C per decade, will actually speed up. The rate of warming over the past 14 years is well above the long-term trend. The debate now, he says, is whether that is an omen of an even darker future.

sciencemag.org, 15 January 2021

<https://www.sciencemag.org>

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1st preserved dinosaur butthole is ‘perfect’ and ‘unique,’ paleontologist says

2021-01-20

The first dinosaur butthole ever discovered is shedding light where the sun don’t shine. The discovery reveals how dinosaurs used this multipurpose opening — scientifically known as a cloacal vent — for pooping, peeing, breeding and egg laying.

The dinosaur’s derrière is so well preserved, researchers could see the remnants of two small bulges by its “back door,” which might have housed musky scent glands that the reptile possibly used during courtship — an anatomical quirk also seen in living crocodilians, said scientists who studied the specimen.

Although this dinosaur’s caboose shares some characteristics with the backsides of some living creatures, it’s also a one-of-a-kind opening, the researchers found. “The anatomy is unique,” study lead researcher Jakob Vinther, a paleobiologist at the University of Bristol in the United Kingdom, told *Live Science*. It doesn’t quite look like the opening on birds, which are the closest living relatives of dinosaurs. It does look a bit like the back opening on a crocodile, he said, but it’s different in some ways. “It’s its own cloaca, shaped in its perfect, unique way,” Vinther said.

PLAY SOUND

The well-preserved booty belongs to the dinosaur *Psittacosaurus*, a bristly tailed, Labrador-size, horn-faced dinosaur, meaning it was a relative of *Triceratops*. Like its famous tri-horned cousin, *Psittacosaurus* lived during the Cretaceous period, which lasted from about 145 million to 65 million years ago. Previously, Vinther and his colleagues had studied this *Psittacosaurus* specimen, found in China, to determine its skin color, and at the time, he noted that its nether regions were preserved.

“Then, I got a chance to look at the specimen again, up close, and suddenly realized, ‘Oh my god, the cloaca is actually quite well preserved, and we can actually see some anatomy that I didn’t think we could see,’” Vinther said. So, he took a closer look with study co-researchers Robert Nicholls, a paleoartist, and Diane Kelly, an expert on vertebrate penises and copulatory systems at the University of Massachusetts Amherst.

None of the reproductive soft tissues (like a penis) were preserved. So the researchers can’t say whether the dinosaur was male or female. Even so,

It’s its own cloaca, shaped in its perfect, unique way,” Vinther said.

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this dinosaur likely had copulatory sex, unlike some birds that bump butts when they do a “cloacal kiss” during reproduction, Vinther said.

To get a more complete picture of Psittacosaurus’ cloacal vent, Kelly compared it with those of living land vertebrates. The vent is the opening, and the cloaca, which comes from the Latin word for “sewer,” is the muscular chamber behind it. Based on its preserved anatomy, the opening could have been either horizontally oriented, like a bird’s, or vertically oriented, like a crocodile cloaca, she said.

Moreover, the team noticed that the outer regions of the cloaca were covered with a dark shade of melanin. Perhaps this darkly pigmented area was a type of visual display, similar to bright-red butts seen in baboons, the researchers said. The reddish-brown Psittacosaurus was countershaded, meaning it had a dark back and a light underside, so its pigmented posterior would have stood out, he said.

This dark melanin may have also provided antimicrobial protection — something seen in humans. “We have melanin in certain parts of the body that never sees the light of day,” Vinther said. “Our liver is chock-full of melanin ... because we don’t want microbial infections in these places.”

The pigmented lobes on each side of the dinosaur’s anal opening might have held musk-secreting glands, the researchers added. These glands are found in both male and female crocodilians, and in those creatures, they release a fatty, smelly substance during courtship, Kelly told Live Science.

And, just like in most land vertebrates (except for mammals, which have more than one hole for defecation, urination and reproduction), this dinosaur used its hole for everything, which explains why researchers found a fossilized poop in its butt. “It’s like a Swiss Army knife of excretory openings,” Vinther said. “It does everything.”

The same Psittacosaurus cloacal vent was described in October 2020, when another team posted their research in the BioRxiv database, meaning it has yet to be peer-reviewed or published in a journal. Vinther, who had shared his data with that team for another project, said the researchers used the cloacal vent data without his permission. However, “there were misunderstandings and miscommunications about the nature of the research on both sides,” said Phil Bell, a senior lecturer of paleontology at the University of New England in Australia, one of the researchers on the October 2020 study.

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The new study was published online Tuesday (Jan. 19) in the journal Current Biology.

Originally published on Live Science.

livescience.com, 20 January 2020

<https://www.livescience.com>

California adds fact sheet on N-Methylpyrrolidone exposure to Proposition 65 website

2021-01-18

A fact sheet released in March by the California Office of Environmental Health Hazard Assessment warns consumers about exposures to N-Methylpyrrolidone, or NMP, a chemical component of products that remove or strip away paint, graffiti, and coatings. NMP appears on California’s Proposition 65 list due to its potential to cause birth defects or other reproductive harm. Proposition 65 requires businesses to warn California residents about significant exposures to chemicals that cause cancer or have reproductive toxicity. The most likely route of exposure to NMP for consumers is through skin contact with paint strippers and similar products, according to the fact sheet. But inhalation exposure is also a concern, particularly stemming from use of aerosol products that contain NMP. California OSHA’s permissible exposure limit for workplace exposure to NMP is 1 part per million as an 8-hour, time-weighted average. The California exposure limit also has a skin notation indicating that NMP can be easily absorbed into the bloodstream through the skin. The fact sheet recommends that consumers use NMP-containing products outdoors if possible, to limit their use to no more than four hours per day, and to use NMP-resistant gloves. Indoor areas where NMP is to be used should be well ventilated. NMP is a common alternative to the solvent methylene chloride, which is also present in paint and coatings strippers and removers. An investigative report in 2015 by the Center of Public Integrity linked methylene chloride to at least 56 accidental exposure deaths—both occupational and non-occupational—between 1980 and 2015. In 2019, EPA banned retail distribution of methylene chloride in paint and coating removal products for consumer use but did not ban commercial uses. Read California’s NMP fact sheet. ~ssynergist.aiha.org, date

<https://www.synergist.aiha.org>

NMP appears on California’s Proposition 65 list due to its potential to cause birth defects or other reproductive harm.

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McDonald's pledges to stop using PFAS in food packaging by 2025

2021-01-15

Burgers, fries, cookies and other menu items at the world's largest fast food chain will no longer come with a side of "forever chemicals" after McDonalds phases out toxic per- and polyfluoroalkyl substances called PFAS from its food packaging over the next several years.

This week, the restaurant giant announced that it would stop using food wrapping treated with PFAS chemicals, a move that follows pressure from advocacy groups who've targeted McDonalds and other fast chains over the past year, hoping to convince them to ditch the chemicals out of concern they're getting into humans and accumulating in landfills.

Those groups notched a win this week, although they urged the company to move faster to eliminate the chemical group use. There's hope that McDonalds' move away from PFAS will have a domino effect on other fast food chains.

McDonalds said it previously stopped using the long-chain compounds PFOS and PFOA in 2008, and "we're proud to take another step in our product stewardship journey with our commitment to remove all added fluorinated compounds from our guest packaging materials globally by 2025."

The company has more than 38,000 locations worldwide.

Advocates in Michigan celebrated the news, which follows the adoption of new state rules last year that severely limit the allowable levels of some PFAS in drinking water.

Reducing the amount of PFAS in single-use items like food packaging can drop the amount of such chemicals in landfills, where the robust compounds concentrate in leachate that's treated by wastewater plants which aren't usually able to remove PFAS from their discharge.

The result is toxic compounds that don't readily break down in nature or people's bodies migrating from discarded consumables to surface water and drinking water supplies.

Exposure to PFAS has been linked to thyroid disease, high cholesterol, damaged immune system response and other health problems in humans.

There's hope that McDonalds' move away from PFAS will have a domino effect on other fast food chains.

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"The commitment from the largest fast food-chain in the world, McDonald's, will help drive PFAS out of food packaging elsewhere, too," said Mara Herman, a health policy specialist at the Ann Arbor-based Ecology Center. "It furthers the larger mission we are actively pursuing of eliminating non-essential uses of PFAS. We have to get PFAS out of products to get these harmful pollutants out of our drinking water."

Concern over PFAS chemicals in drinking water rose to prominence in Michigan several years ago upon discovery of sky-high levels of groundwater pollution near Rockford, where footwear giant Wolverine World Wide dumped the chemicals into unlined landfills years ago.

Subsequent statewide drinking water testing found at least trace levels of the compounds in water supplies serving about 1.9 million people.

Municipal wastewater has emerged as a significant source of PFAS contamination entering the environment, as well as the application of wastewater biosolids on cropland. Both pathways have been under study by Michigan regulators for several years and the state has reported some success in reducing the chemical load exiting wastewater plants.

Statewide, there are 152 locations under investigation where the chemicals exceed new state thresholds in groundwater developed at the direction of Gov. Gretchen Whitmer.

Michigan launched an epidemiological health study last fall in Kalamazoo and Kent counties, where people exposed to high PFAS levels in drinking water through the former municipal supply in Parchment and Cooper Township, and contaminated groundwater in the Rockford and Belmont area, will have blood samples analyzed over the next several years.

The state is also launching an assessment of PFAS exposure in Oscoda, where contamination from the former Wurtsmith Air Force Base has spread through water and wildlife.

Nationally, movement toward federal rules to regulate PFAS in drinking water failed to gain traction under the Trump administration and safety standards vary among states that have developed their own. Issue advocates are hopeful the incoming Joe Biden administration will move quickly to develop new regulations this year.

[mlive.com](https://www.mlive.com), 15 January 2021

<https://www.mlive.com>

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Electric car batteries with five-minute charging times produced

2020-01-19

Batteries capable of fully charging in five minutes have been produced in a factory for the first time, marking a significant step towards electric cars becoming as fast to charge as filling up petrol or diesel vehicles.

Electric vehicles are a vital part of action to tackle the climate crisis but running out of charge during a journey is a worry for drivers. The new lithium-ion batteries were developed by the Israeli company StoreDot and manufactured by Eve Energy in China on standard production lines.

StoreDot has already demonstrated its "extreme fast-charging" battery in phones, drones and scooters and the 1,000 batteries it has now produced are to showcase its technology to carmakers and other companies. Daimler, BP, Samsung and TDK have all invested in StoreDot, which has raised \$130m to date and was named a Bloomberg New Energy Finance Pioneer in 2020.

The batteries can be fully charged in five minutes but this would require much higher-powered chargers than used today. Using available charging infrastructure, StoreDot is aiming to deliver 100 miles of charge to a car battery in five minutes in 2025.

"The number one barrier to the adoption of electric vehicles is no longer cost, it is range anxiety," said Doron Myersdorf, CEO of StoreDot. "You're either afraid that you're going to get stuck on the highway or you're going to need to sit in a charging station for two hours. But if the experience of the driver is exactly like fuelling [a petrol car], this whole anxiety goes away."

"A five-minute charging lithium-ion battery was considered to be impossible," he said. "But we are not releasing a lab prototype, we are releasing engineering samples from a mass production line. This demonstrates it is feasible and it's commercially ready."

Existing Li-ion batteries use graphite as one electrode, into which the lithium ions are pushed to store charge. But when these are rapidly charged, the ions get congested and can turn into metal and short circuit the battery.

The StoreDot battery replaces graphite with semiconductor nanoparticles into which ions can pass more quickly and easily. These nanoparticles are currently based on germanium, which is water soluble and easier to

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handle in manufacturing. But StoreDot's plan is to use silicon, which is much cheaper, and it expects these prototypes later this year. Myersdorf said the cost would be the same as existing Li-ion batteries.

"The bottleneck to extra-fast charging is no longer the battery," he said. Now the charging stations and grids that supply them need to be upgraded, he said, which is why they are working with BP. "BP has 18,200 forecourts and they understand that, 10 years from now, all these stations will be obsolete, if they don't repurpose them for charging – batteries are the new oil."

Dozens of companies around the world are developing fast-charging batteries, with Tesla, Enevate and Sila Nanotechnologies all working on silicon electrodes. Others are looking at different compounds, such as Echion which uses niobium oxide nanoparticles.

Tesla boss Elon Musk tweeted on Monday: "Battery cell production is the fundamental rate-limiter slowing down a sustainable energy future. Very important problem."

"I think such fast-charging batteries will be available to the mass market in three years," said Prof Chao-Yang Wang, at the Battery and Energy Storage Technology Center at Pennsylvania State University in the US. "They will not be more expensive; in fact, they allow automakers to downsize the onboard battery while still eliminating range anxiety, thereby dramatically cutting down the vehicle battery cost."

Research by Wang's group is being developed by the company EC Power, which he founded. It carefully increases the temperature of the battery to 60C, which enables the lithium ions to move faster, but avoids the damage to the battery usually caused by heat. He said this allowed a full charge in 10 minutes.

Wang said new research published in Nature Energy on Monday showed this battery could be both affordable and eliminate range anxiety. "Finally we are achieving parity with gasoline vehicles in both cost and convenience. We have the technology for \$25,000 electric cars that race like luxury sport cars, have 10-minute rechargeability and are safer than any currently on the market."

Wang noted that fast charging must also be repeatable at least 500 times without degrading the battery to give it a reasonable life and that the EC power battery can do so 2,500 times. Myersdorf said the StoreDot battery could be recharged 1,000 cycles while retaining 80% of original capacity.

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Anna Tomaszewska, at Imperial College London, UK, who reviewed the fast-charging batteries in 2019, was more cautious about the speed of their rollout. "I think technologies [like StoreDot's] could start entering the market in the next five years or so. However, since they will be more difficult and expensive to manufacture, we're likely to initially only see them in niche markets that are highly performance-driven and not as price-sensitive as electric vehicles," she said.

[theguardian.com](https://www.theguardian.com), 19 January 2021

<https://www.theguardian.com>

Does Roundup cause cancer?

2021-01-19

Roundup products, herbicides that contain the chemical glyphosate, have been brought to attention for their potential role in causing cancer in humans. There is evidence from cell studies in the lab, animal studies, and human population studies that associate Roundup exposure with non-Hodgkin lymphoma in humans. A combination of these factors led the International Agency for Research on Cancer (IARC) to classify glyphosate as a group 2A (probable) carcinogen.

Since an association does not mean causation, we will address the research available regarding Roundup, as well as alternatives for both agriculture and home gardening.

What Is Roundup?

Roundup is a very popular herbicide—or weed killer—that is most commonly used in agriculture. The key ingredient in Roundup is glyphosate, a compound with a molecular structure similar to the amino acid glycine.

Background on Roundup (Glyphosate)

Glyphosate, the active ingredient in Roundup products was first sold as an herbicide in 1974. Since that time, it has grown to become the most widespread herbicide used in the United States. While in use since 1974, it's estimated that as of 2016, two-thirds of the volume of glyphosate applied to crops had been sprayed in only the preceding decade.¹

How It Works

Glyphosate works by inhibiting an enzyme in plants that is needed to manufacture a few amino acids (the building blocks of proteins). Since

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this enzyme and pathway are present only in plants (not humans or other animals) it was thought to be relatively non-toxic. Glyphosate also appears to bind (chelate) some minerals (such as calcium, magnesium, manganese, and iron) that are important for plant growth.²

Uses

In the U.S., Roundup is applied to control weeds and may also be used as a desiccant—a hygroscopic substance used as a drying agent. In the U.S. it is used along with crops that are genetically modified (GMO). In this setting, the GMO crops are resistant to the enzyme inhibition while nearby weeds in the vicinity are not. These "Roundup Ready" crops include:

Soybean

Corn

Some cotton

Alfalfa

Sugar beets

In Europe, GMO crops are not approved, so it is used somewhat differently.

Human Exposure

Human exposure to glyphosate has increased significantly since it was first used. Levels (measured by urine samples) in people over the age of 50 increased by 500% between the years 1993 and 1996 and follow-up measurements done between 2014 and 2015.³

Role in Cancer

In considering whether Roundup may play a role in cancer, it's important to look at the evidence in several different ways. After all, it would be unethical to expose one group of people to large amounts of Roundup and another to none (the control group) to see if the group exposed developed more cancers. There are a number of different types of evidence that scientists use in addressing cancer risk.

Evidence

Some of the lines of evidence that might support the role of a chemical in causing cancer include:

Mechanism: Does the chemical cause the type of damage to DNA in cells that could lead to cancer?

A combination of these factors led the International Agency for Research on Cancer (IARC) to classify glyphosate as a group 2A (probable) carcinogen.

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In vitro (lab) cell studies: What effect does Roundup have on cells, including cancer cells, grown in a dish in the lab?

Animal studies: Does the substance cause cancer in laboratory animals?

Human studies: Since it would be unethical to expose one group of people to Roundup and not another, research looks at population studies. For example, do people living in regions where Roundup is more commonly used have a higher incidence of any types of cancer? Is there a correlation between Roundup use and the incidence of any cancers over time? Does the incidence of a type of cancer correlate with measurements of glyphosate residual in people, for example, in urine specimens?

How roundup affects plants: Could Roundup alter plants so that they are more or less likely to cause disease when subsequently ingested?

Correlation of cancer incidence and use of glyphosate over time: Are there any cancers that began to increase when glyphosate use was started in the U.S. or other regions of the world?

The reason that several angles of research are needed is that correlation doesn't necessarily mean causation. For example, the incidence of cancer may increase at the same time that Roundup use was increasing, but there are a number of other things that could be responsible as well.

An example often used by epidemiologists is that of ice cream and drownings. People tend to consume more ice cream in the summer and there are also more drownings in the summer, but this does not mean that ice cream causes drownings.

Carcinogen Status

In 2015, glyphosate was classified as a probable human carcinogen (group 2A) by the International Agency for Research (IARC).

In Vitro Cell Studies and Mechanisms of Carcinogenicity

Scientists have looked at the effect of glyphosate on lymphocytes (a type of white blood cell) grown in a dish in the lab (in vitro) to evaluate potential DNA damage, as well as the type of damage that occurs if found.

Exposure to glyphosate was found to cause DNA damage (and other changes) similar to that seen with exposure to the common chemotherapy drug VePesid (etoposide). This was an acute change, but the authors postulated that chronic exposure could result in cumulative damage over time. Other studies have also shown evidence of damage to DNA as well

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as chromosomes in human cell lines as well as the ability of glyphosate to trigger oxidative stress.⁴

In an in-vitro study using human breast cancer cells, low concentrations of glyphosate (similar to what would be found in an average adult), resulted in more rapid growth (proliferative effects) of tumors that were hormone-dependent (estrogen/progesterone receptor-positive cancer cells). More rapid growth was not seen, however, in breast cancer cells that were not hormone dependent, suggesting that glyphosate has estrogen-like activity at least in this setting. (Glyphosate also altered estrogen receptor expression.)⁵

While studies thus far have only been done in vitro, this should be evaluated further. Estrogen receptor-positive breast cancer is the most common type of breast cancer. In addition, it is the type of breast cancer that can recur many years or decades after the initial treatment of early-stage cancer (late recurrence), and it's largely unknown why some tumors recur and others do not. Whether the anti-estrogen therapies many women use after primary treatment would counteract any potential effect of glyphosate is unknown.

Affect of Roundup on Animals

Roundup (glyphosate) is thought to have "sufficient evidence" of being carcinogenic (cancer-causing) in animals according to the IARC.⁶

In a 2020 review of several studies on rats and mice (looking at chronic exposure and carcinogenicity), there was relatively strong evidence that glyphosate can lead to hemangiosarcomas (tumors of blood vessels), kidney tumors, and lymphomas. Other tumors that were found to be increased included basal cell cancers of the skin, tumors of the adrenal gland, and liver tumors.⁷

Looking at the underlying mechanism (at least with lymphomas), a different study found that glyphosate was able to induce the mutations in B cells that can play a role both in B-cell non-Hodgkin's lymphoma and multiple myeloma.⁸

Population Studies (Human)

A number of epidemiological (population-based) studies have now shown an association between Roundup and non-Hodgkin lymphoma (NHL). Non-Hodgkin's lymphoma is a cancer of the type of white blood cells called lymphocytes (either T cell or B cells) and is relatively common.

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Roughly 2.1% of people are expected to develop NHL over their lifetime, with the incidence slightly higher in men than in women.⁹

While correlation does not mean causation, it's been noted that the incidence of NHL doubled between 1975 and 2006. In addition, the incidence of NHL is higher in people who have had occupational exposure to glyphosate-containing herbicides or who live near farmland that is routinely treated with herbicides.¹⁰

Other potential exposures have been looked at with the rise in NHL, including that of radon exposure in the home as regions that tend to have high levels of radon in the soil also tend to have high levels of NHL.¹¹

A number of studies looking at NHL and glyphosate have been done in the US and Europe since 2001. In 2008, a Swedish study looking at people between the age of 18 and 74 found a strong association between herbicides in general, glyphosate specifically, and non-Hodgkin lymphoma (those with exposure to glyphosate were twice as likely to have developed NHL).¹²

A 2019 meta-analysis of six studies supports this association further. Overall, those exposed to the highest level of glyphosate were 41% more likely to develop non-Hodgkin lymphoma. The authors note that, in addition to the epidemiological association, evidence for a role in NHL is supported by links between glyphosate exposure and immunosuppression, endocrine disruption, and the type of genetic alterations often seen with NHL.¹³

Relative Risk vs. Absolute Risk

When looking at cancer risk, it's important to describe what the statistics surrounding increased risk really mean. Relative risk refers to how much more likely a person might be to develop cancer than someone who is not exposed to a carcinogen. In this case, relative risk was 41%. Absolute risk, however, refers to how much more likely that means that you might develop NHL. In this case, the absolute risk is 0.8%. If your lifetime risk of developing NHL (on average, as there are other risk factors) is 2%, it might increase to 2.8% with exposure to glyphosate.

Not all studies, however, have shown an association between Roundup (glyphosate) and NHL. A large 2018 study published in the Journal of the National Cancer Institute did not find any apparent association between glyphosate exposure and any solid tumors or blood-borne cancers overall. There was some evidence of an elevated risk of acute myelogenous

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leukemia in those who had the greatest exposure, but this would require confirmation. This study was done with the use of questionnaires, and due to a high incidence of failure to complete the study, no solid conclusions could be drawn.¹⁴

These findings in which some studies, but not all, suggest a link between exposure and cancer are very common when looking for the causes of cancer. This is where it is very helpful to look not only at population studies, but animal studies, cell studies, and potential mechanisms to determine if the positive findings are likely significant.

Glyphosate and Plant Nutrients

Yet another angle to look at when studying glyphosate exposure and cancer risk is not related to the exposure to glyphosate, but rather how glyphosate may affect the nutrients in the foods that are grown or their toxicity.

Some researchers are concerned that glyphosate, by binding with minerals in the soil (chelation), could make plants more toxic or reduce the plant's uptake of nutrients from the soil. In turn, the foods that people eat that have been treated with glyphosate could potentially be toxic or lack the nutrients (some of which may be linked to cancer reduction) present in plants not grown with the use of glyphosate. Whether this is a concern to humans is unknown at this time, but is something that should be considered if glyphosate use is going to continue to increase in the US.²

Other Medical Concerns

In addition to cancer risk, the use of Roundup has raised concern over other medical problems as well. Some of these include:

Fatty liver disease: Mice fed a dose of glyphosate estimated to be 100 times lower than that found in the average human were found to develop liver dysfunction similar to nonalcoholic fatty liver disease.¹⁵ It's important, of course, to note that the effect of a chemical in rodents doesn't necessarily translate to effects in humans.

Birth defects: A study in Argentina found that regions where glyphosate concentrations in the soil were high had twice the rate of birth defects and three times the rate of miscarriages compared with regions that had lower concentrations of the chemical. Again this was correlation and doesn't necessarily imply causation.¹⁶ Birth defects have also been noted in baby pigs that have been fed soybeans containing glyphosate residue, and

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similar birth defects have been seen in humans who live near farmland where Roundup is used.¹⁰

Effects in pregnancy: In rats, it was found that exposure to glyphosate during pregnancy altered the expression of some genes associated with oxidant defense, inflammation, and fat metabolism. In theory, it's possible that exposure to Roundup in utero could result in long-term neurological effects (but again, this study was only done on rodents).¹⁷

There are also reports that suggest a potential impact of Roundup on the liver, kidneys, general metabolic processes, as well as the composition of the gut microbiome.

Regulations and Additional Concerns

In addition to medical concerns the increasing use of Roundup, and especially with larger volumes being needed as resistance develops, raises other issues including both ecological and environmental concerns. These may be due to glyphosate, the metabolic product AMPA, both, or the effect when combined with genetically engineered proteins.

Studies have found that Roundup can alter the normal bacterial content of soil, as well as organisms such as earthworms, monarch butterflies, and honeybees.

With regard to human health, the Environmental Protection Agency (EPA) has set a glyphosate daily chronic Reference Dose (cRfD) of 1.75 milligrams (mg)/kilogram (kg) of body weight daily. The European Union (EU) also has a cRfD, though the cut-off is lower than the US at 0.5 mg/kg/day. In EU the scientists have now recommended the cut-off level for operators to be 0.1 mg/kg/day.

Despite these numbers, it can be hard to grasp what level of exposure might be concerning with respect to cancer. According to the EPA, a carcinogen is thought to have an "acceptable risk" if it is thought to "only" lead to cancer in 1:10,000-1 million people over their lifetime. That said, in the occupational setting, a higher risk (up to 1:1000) is generally allowed.¹

Alternatives to Roundup

There are potential alternatives to the use of Roundup products both in agriculture and in home gardens.

Home Garden

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In your home garden there are a number of alternatives to using herbicides. These can include:

Hand pulling weeds

Using very hot water (but it's important to be careful to avoid burns)

Depending on the weeds, your local horticulture association can probably give you non-toxic ideas for removing weeds, ranging from vinegar to other solutions

Farming

Researchers have been looking into a number of alternatives to Roundup on an agricultural scale, especially with some countries banning or limiting the use of glyphosate (such as Austria, France, Germany, and Vietnam).

Even where Roundup is fully allowed, it's recommended that contingency plans be formulated beginning now. Even without limitations, the growing resistance of weeds to glyphosate will likely result in the need for alternative methods of weed control in the near future.

Physical/mechanical methods (such as tilling and cutting) are one option. Cultural methods such as covering crops, changing planting times, and reseeding may also reduce the need for chemical control.¹⁸

Protecting Yourself

If you use products such as Roundup at home or at work or if you live near a farm where Roundup is applied, there are a number of measures you can take to reduce your exposure.

Application Safety:

When applying Roundup, wear protective clothing (our skin is not an impermeable barrier as evidenced by the multiple medications now available in patch form). Practice caution when removing the clothes you wear as well to avoid exposing family members who may be doing your laundry.

Some people like to wear gloves, but whether you do or not, always wash your hands thoroughly (for at least 20 seconds with soap and water) after you are done.

Consider the use of eye protection, especially if you will be applying herbicides under pressure.

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Do not walk barefoot for at least 24 hours and preferably wait until after it has rained (or been watered) once Roundup is applied. Keep pets away as well.

Do not eat, drink, or smoke while applying any type of herbicides or pesticides

Consider your application method: high-pressure sprayers may result in greater exposure.

Review the material data safety sheets on any chemical you work with on-the-job and follow recommendations for protection.

General Measures to Limit Exposure:

Wash all produce before eating

Avoid home herbicides whenever possible, especially on houseplants

Keep children and pets away from fields that are treated with Roundup (this may require some awareness in places such as parks and playgrounds)

Keep in mind that Roundup is only one chemical in the environment, and it is often a combination of factors rather than one single cause that leads to cancer. There are many potential concerns in the environment (such as Roundup), but well-known concerns as well. Make sure to focus the bulk of your prevention efforts on major risk factors (such as not smoking, avoiding excess sun exposure, and eating a wide variety of fruits and vegetables).

While potential risks and lessening effectiveness may be concerning, this is also an opportunity for researchers to develop alternative weed management techniques that are not only more sustainable and safer, but healthier for the environment as well. There's no need to wait to take action yourself. While the agricultural industry looks into alternative options, people can begin practices that minimize the use of and exposure to glyphosate in their own gardens today.

As a final note, don't limit your consumption of vegetables due to concerns over Roundup residues on your food. When it comes to your daily routine, increasing your intake of vegetables (at least up to 600

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grams/day) is one of the easier ways to reduce your risk of cancer in the future.¹⁹

verywellhealth.com, 19 January 2021

<https://www.verywellhealth.com>

Clothes washing linked to 'pervasive' plastic pollution in the Arctic

2021-01-13

The Arctic is "pervasively" polluted by microplastic fibres that most likely come from the washing of synthetic clothes by people in Europe and North America, research has found.

The most comprehensive study to date found the microplastics in 96 of 97 sea water samples taken from across the polar region. More than 92% of the microplastics were fibres, and 73% of these were made of polyester and were the same width and colours as those used in clothes. Most of the samples were taken from 3-8 metres below the surface, where much marine life feeds.

Other recent analysis estimated that 3,500tn plastic microfibrils from clothes washing in the US and Canada ended up in the sea each year, while modelling suggested plastic dumped in the seas around the UK was carried to the Arctic within two years.

The researchers found plastic fibres at the north pole. With plastic recently discovered at the deepest point on Earth, the Mariana Trench, and the peak of Mount Everest, it is clear humanity's litter has polluted the entire planet. It is known to injure wildlife that mistake it for food. People also consume microplastics via food and water, and breathe them in, although the health impact is not yet known.

Much more water flows into the Arctic from the Atlantic than the Pacific, and the new research found higher concentrations of the microplastic fibres nearer the Atlantic, as well as longer and less degraded fibres.

"We're looking at a dominance of Atlantic inputs, which means sources of textile fibres in the North Atlantic from Europe and North America are likely to be driving the contamination in the Arctic Ocean," said Peter Ross, at Ocean Wise Conservation Association in Canada, who led the study. "With these polyester fibres, we've essentially created a cloud throughout the world's oceans."

The most comprehensive study to date found the microplastics in 96 of 97 sea water samples taken from across the polar region.

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"The Arctic is, yet again, at the receiving end of pollutants from the south," he said. Toxic chemical pollutants including mercury and PCBs are well known at the pole. "It's certainly cause for concern, when we realise that the Inuit people rely very heavily on aquatic foods."

The 3-8m layer of sea water is "a biologically important area where we find phytoplankton, zooplankton, small fish, big fish, seabirds and marine mammals, foraging looking for food", said Ross. Large animals such as turtles, albatross, seals and whales are known to be killed by plastic and he said there was no reason to think it was different for the smaller ones.

The research is published in the journal Nature Communications, and took 71 near-surface samples stretching from Norway to the north pole and then into the Canadian High Arctic. Another 26 samples were taken at depths down to 1,000m in the Beaufort Sea, to the north of Alaska.

"A dominance of polyester was evident throughout the water column, highlighting the pervasive spread of synthetic fibres throughout the waters of the Arctic Ocean," the researchers concluded. They found an average of 40 microplastic particles per cubic metre of water.

The researchers said the type of plastic found at different depths in the oceans would depend on the density of the plastic, with buoyant polystyrene likely to float and dense PVC more likely to sink to the ocean floor. Polyester is closer to neutral buoyancy. Only a small proportion of the fibres found are thought to be from fishing gear, which use different plastics. It is possible that some of the fibres were carried to the Arctic by winds.

"It is impressive how many samples they were able to take from such inhospitable places," said Erik van Sebille, at Utrecht University in the Netherlands. "The results show again plastic is now omnipresent. The question should perhaps become 'where don't we find plastic yet?'"

"Plastic anywhere in the environment is an atrocity, but in the Arctic it's probably more harmful than in most other places," he said. "That's because it comes on top of the dramatic and dangerous climate change that the region and its ecosystems are experiencing. Pollution could be the proverbial drop that tips the bucket, as we say in Dutch."

Ross said individuals, clothes manufacturers, wastewater treatment companies and governments could all help stem the flow of microplastics into the Arctic: "We all have a role to play. It's not about blaming textiles, or

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blaming the petrochemical complex. It's about everybody acknowledging that this is not something that we want to see in the world's oceans."

Van Sebille said: "We could hardly go out and about without clothes, could we? But we should think about better textiles."

[theguardian.com](https://www.theguardian.com), date

<https://www.theguardian.com>

Drones could help create a quantum internet

2021-01-14

The quantum internet may be coming to you via drone.

Scientists have now used drones to transmit particles of light, or photons, that share the quantum linkage called entanglement. The photons were sent to two locations a kilometer apart, researchers from Nanjing University in China report in a study to appear in Physical Review Letters.

Entangled quantum particles can retain their interconnected properties even when separated by long distances. Such counterintuitive behavior can be harnessed to allow new types of communication. Eventually, scientists aim to build a global quantum internet that relies on transmitting quantum particles to enable ultrasecure communications by using the particles to create secret codes to encrypt messages. A quantum internet could also allow distant quantum computers to work together, or perform experiments that test the limits of quantum physics.

Quantum networks made with fiber-optic cables are already beginning to be used (SN: 9/28/20). And a quantum satellite can transmit photons across China (SN: 6/15/17). Drones could serve as another technology for such networks, with the advantages of being easily movable as well as relatively quick and cheap to deploy.

The researchers used two drones to transmit the photons. One drone created pairs of entangled particles, sending one particle to a station on the ground while relaying the other to the second drone. That machine then transmitted the particle it received to a second ground station a kilometer away from the first. In the future, fleets of drones could work together to send entangled particles to recipients in a variety of locations.

[sciencenews.org](https://www.sciencenews.org), 14 January 2021

<https://www.sciencenews.org>

A quantum internet could also allow distant quantum computers to work together, or perform experiments that test the limits of quantum physics.

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Chromatin found to be a gel, which could help explain cancer's spread

2021-12-18

Ultimately, everything is governed by the laws of physics, including gene regulation. Why is it, then, that the laws of physics are so sparingly consulted when biologists describe chromatin, that complex package of DNA and protein? Generally, it is assumed that chromatin is in the liquid state, and that regulatory proteins may drift about the nuclear depths, chancing upon their target DNA unless something near that DNA, something molecular or macromolecular, should present an obstacle. But perhaps things in the nucleus are a little less fluid, a little more organized at the supramolecular level, thanks to physical laws that pertain to states of matter.

This possibility seems a little firmer now that University of Alberta researchers are describing what they observed after examining the physical state of chromatin in vitro and in vivo. The researchers, led by department of oncology professor Michael Hendzel, PhD, and collaborator Jeffrey Hansen, PhD, a professor at Colorado State University, are reporting that chromatin is neither a solid nor a liquid, but something more like a gel.

The scientists published their findings in the journal *Cell*, in an article titled, "Condensed Chromatin Behaves like a Solid on the Mesoscale In Vitro and in Living Cells." The article suggests that thinking of chromatin as a gel could lead to a more accurate understanding of how the genome is encoded and decoded.

"[While] there is evidence for a liquid compartment associated with heterochromatin, we find that the chromatin, itself, is not in a liquid state," the article's authors wrote. "We, therefore, conclude that chromatin is a solid-like scaffold that can support the assembly of liquid-like compartments enriched in specific effector proteins that percolate throughout the fiber matrix."

The article's authors also introduced various physical scenarios to give their ideas form. "We all know the difference between water and ice, and we all understand that if you want to tie two things together, for example, you can't do it with a liquid. You need a rope, something that has mechanical strength," said Hendzel, who is also a member of the Cancer Research Institute of Northern Alberta (CRINA). "That's what we're talking about here."

Why is it, then, that that the laws of physics are so sparingly consulted when biologists describe chromatin, that complex package of DNA and protein?

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"Another way to look at it is that bone, muscle, and connective tissue all have very different physical properties, and if those physical properties break down somehow, it's almost always associated with disease," said Alan Underhill, PhD, associate professor in the department of oncology at University of Alberta, CRINA member, and contributor to the study. "In the case of chromatin, it's about scaling this principle down to the level of the cell nucleus, because it is all connected."

"What we're seeing here bridges the biochemistry of cellular contents and the underlying physics, allowing us to get at the organizational principles—not just for cells, but the entire body," he added.

"Our results reveal that condensed chromatin exists in a solid-like state whose properties resist external forces and create an elastic gel and provides a scaffold that supports liquid-liquid phase separation of chromatin binding proteins," the article's authors noted.

All of our chromosomes are made from chromatin, which is half histone (or structural) proteins and half DNA, organized into long strings with bead-like structures (nucleosomes) on them. Inside the nucleus of a cell, the chromatin fiber interacts with itself to condense into a chromosome. The chromatin fiber also supports gene expression and replication of chromosomal DNA. Although there is some understanding of the structures that make up a nucleus, how those structures are organized and the full extent of how the structures interact with each other is not well known.

The team's findings bridge research done over the past 50 years on chromatin gels produced in the laboratory to demonstrate its existence in living cells, which has major implications for interpreting their elastic and mechanical properties, Hendzel explained.

For example, recent studies have shown that the deformability of chromatin in cancer cells is an important determinant of their ability to squeeze through small spaces to travel outside a tumor and metastasize elsewhere in the body—something that may become easier to explain if it turns out that there are times when the chromatin gel may become less firm.

In cancer cells, chromatin may become less sticky if its histone part undergoes certain chemical changes. This process may be all the more relevant to cancer researchers if it occurs along with a shift in chromatin's gel state, a process that would reduce the strength of the gel, making it more deformable and enabling cancer cells to spread through the body.

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Defining how the gel state is regulated could lead to new approaches to prevent metastasis by finding drugs that maintain the chromatin gel in a more rigid state.

A better understanding of chromatin could also affect cancer diagnosis, Underhill said.

“The texture and appearance of chromatin is something pathologists have used to do clinical assessment on tumor samples from patients,” he said. “It’s really looking at how the chromatin is organized within the nucleus that allows them to make insight into that clinical diagnosis. So, now that’s a process that we can reframe in a new context of the material state of the chromatin.”

Henzel said he is confident the discovery of the gel-like state of chromatin will provide a guiding principle for future research seeking to understand how the material properties of chromatin shape the function of the nucleus to ensure the health of cells and the organisms they make up.

“One of the most significant things to me is that this research highlights how limited our knowledge is in this area,” he said. “Currently, we are focused on testing the widely held belief that the physical size of molecules determines their ability to access the DNA. Our ongoing experiments suggest that this too may be incorrect, and we are quite excited about learning new mechanisms that control access to DNA based on the properties of the chromatin gel and the liquid microenvironments that assemble around it.”

“I think it forces us to go back and look at what’s in textbooks and reinterpret a lot of that information in the context of whether ‘this is a liquid,’ or ‘this is a gel’ in terms of how the process actually takes place,” added Underhill. “That will have a lot of impact on how we actually think about things moving forward and how we design experiments and interpret them.”

genengnews.com, 18 December 2021

<https://www.>

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Study reveals UV LED lights effectively kill a human coronavirus

2020-12-20

Although the researchers found that UV LED irradiation killed HCoV-OC43, the Tel Aviv University press release warns that this technology is hazardous and does not recommend it for residential use.

It is well known that SARS-CoV-2, which is the virus that causes COVID-19, can spread through respiratory droplets and surfaces contaminated by nasal, mouth, and eye secretions.

According to a review article in the journal Environmental Research, SARS-CoV-2 was present in air samples from areas such as hospital rooms and elevators. It was also measurable in poorly ventilated or crowded spaces.

SARS-CoV-2 was also viable for several days on common surfaces, such as stainless steel and plastic.

Because of the urgent need to find effective disinfection methods for SARS-CoV-2, researchers from Tel Aviv University in Israel — in collaboration with the University of Haifa, Oranim Academic College, and Chaim Sheba Medical Center at Tel HaShomer — set out to investigate whether or not irradiation using UV LED would inactivate human coronaviruses.

They recently published their results in the Journal of Photochemistry and Photobiology B: Biology.

Scientists put UV LEDs to the test

Using the human coronavirus OC43 (HCoV-OC43) as a substitute for SARS-CoV-2, the research team tested different UV LED bulbs emitting varying wavelengths — measured in nanometers (nm) — to see which would effectively inactivate the HCoV-OC43 virus.

After exposing viral suspensions placed in darkened tubes to UV LED light, the team found that wavelengths of 285 nm were highly effective at inactivating the virus and almost as effective as wavelengths of 265 nm, inactivating 99.9% of the coronavirus in under 30 seconds.

Furthermore, other viruses showed similar sensitivity to these wavelengths, indicating that this technology could be useful against many types of human coronavirus, including SARS-CoV-2.

SARS-CoV-2 was also viable for several days on common surfaces, such as stainless steel and plastic.

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The researchers say that these findings are significant because not only does the 285-nm UV LED light disinfect coronaviruses, but it is also less expensive and more readily available than the 265-nm variety.

“We discovered that it is quite simple to kill the coronavirus using LED bulbs that radiate [UV] light.”

— Prof. Hadas Mamane

Because the researchers used HCoV-OC43 instead of SARS-CoV-2, they say that their future work will aim to confirm these results by testing the impact of LEDs and their combinations on the virus that causes COVID-19.

Bottom of Form

Why did they use a surrogate virus?

As study co-author Dr. Yoram Gerchman told Medical News Today, “SARS-CoV-2 requires a Bio Safety Level 3 (BSL3) laboratory to propagate (although not for analysis) because the disease it causes is much more severe.”

“The [HCoV-OC43 virus] needs only a Bio Safety Level 2 [laboratory]. At the time, the BSL3 [laboratory] in [the] Sheba hospital virology center was under renovation, and we did not want to delay.”

Dr. Gerchman explains that it is common to use bacteriophages, which are viruses that infect bacteria but not humans, as surrogates, as researchers can work with them in a Bio Safety Level 1 laboratory.

Additionally, the surrogate virus the team used in the study belongs to the same betacoronavirus genus as SARS-CoV-2 and closely resembles it in size and structure.

Could UV LED disinfection be safer?

The COVID-19 pandemic has increased the use of disinfectants in both public settings and households.

Recent research in the journal Environmental Science & Technology Letters found an increase in the number of quaternary ammonium compounds (QACs) in house dust collected from homes after the pandemic began. QACs are chemicals in cleaning and disinfecting products that cause reproductive and respiratory harm.

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Additionally, the use of large amounts of disinfectant chemicals can harm wildlife and urban environments, according to a review in the journal Environmental Research.

Due to the hazards of chemical methods, professionally designed UV LED disinfection systems may be a safer solution — one that can disinfect surfaces, air, and water.

According to Prof. Mamane, the researchers “killed the viruses using cheaper and more readily available LED bulbs, which consume little energy and do not contain mercury like regular bulbs.”

“Our research has commercial and societal implications, given the possibility of using such LED bulbs in all areas of our lives, safely and quickly.”

medicalnewstoday.com, date

<https://www.medicalnewstoday.com>

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Curiosities

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The history of WD-40 is stranger than you think

2021-01-25

First off, let me be clear that while, yes, I am talking about WD-40, a commercially available product, I in no way care if you buy it or not. This is not sponsored content, and I have no dog in this pond. I don't care if you never, ever buy WD-40 ever again to use on your car projects, just to spite me, and maybe even go out of your way to see to it that nobody you know ever buys it. That's fine. Have at it. I just want to talk about the history of WD-40, which, I believe, is interestingly unexpected.

Here's the big clue as to what makes the origin of the anti-squeak, stuck-bolt-loosener spray so interesting: the company that makes it was originally called Rocket Chemical Company because they made chemicals, for rockets.

Specifically, they were making a chemical for a particular rocket, the Atlas rocket. Even though many of us think of Atlases as the rockets that launched some of the early Mercury astronauts into space, the Atlas started out as a missile, and was the first operational intercontinental ballistic missile.

As a missile, Atlases were expected to be built and ready to wait for indefinite periods of time, but ready to launch in case everything went terribly wrong and the United States decided it needed to launch some nukes at someone halfway across the globe.

As you can imagine, a missile waiting for use is susceptible to corrosion and rust, which are bad for the sorts of delicate explodey parts on a missile, so some way of inhibiting that corrosion and rust on the missile's outer skin would be needed.

This is what the Rocket Chemical Company figured out how to make: a coating for Atlas missiles that prevented rust and corrosion. The WD part of the name was descriptive for what the coating did to Water, which was Displace it, and it took the company 40 tries to get it right. I bet you can figure it out from there.

The Rocket Chemical company soon found that employees were taking home WD-40 for their own personal and very possibly erotic (unproven) uses, and so began to commercialise it in cans starting in 1958.

Early WD-40 cans included a rocket silhouette in the logo, giving some clue about the product's origins, though more recent logo updates give no clue as to the product's origins at all.

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In 1969, the company finally changed their name from Rocket Chemical Company to WD-40, since that remained their lone product. That's also interesting, I think, that a company like this could focus entirely on one niche product—albeit a product with a pretty unlimited set of potential use cases, since all kinds of things can stick or squeak or potentially rust, or just need general lubrication.

WD-40's formula is a secret. To once again remind you that this is not sponsored, I'll happily repeat a rumour I heard that WD-40 includes adorable otter ejaculate as a major ingredient. Again, I have no proof, but I'm pretty certain this is not the sort of thing the WD-40 people want associated with their slippery fluid that excretes via a long, slender red tube.

They also wouldn't like the rumour that the smell of WD-40 makes most people wet themselves.

So, there you go—this wildly popular and common product—a 1993 study discovered it was found in four out of five American homes—started off as something that only a tiny fraction of Americans would ever even come into contact with, since rocket ownership is still, you know quite low, and became one of the most common products ever.

Weird, right? I thought so. Oh, and again, you do not have to buy the stuff. Your call.

This article was originally published in February 2020.

[gizmodo.com.au](https://www.gizmodo.com.au), 25 January 2021

<https://www.gizmodo.com.au>

Some electric eels coordinate attacks to zap their prey

2021-01-14

One Volta's electric eel — able to subdue small fish with an 860-volt jolt — is scary enough. Now imagine over 100 eels swirling about, unleashing coordinated electric attacks.

Such a sight was assumed to be only the stuff of nightmares, at least for prey. Researchers have long thought that these eels, a type of knifefish, are solitary, nocturnal hunters that use their electric sense to find smaller fish as they sleep (SN: 12/4/14). But in a remote region of the Amazon, groups of over 100 electric eels (*Electrophorus voltai*) hunt together, corralling

Such a sight was assumed to be only the stuff of nightmares, at least for prey.

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thousands of smaller fish together to concentrate, shock and devour the prey, researchers report January 14 in *Ecology and Evolution*.

“This is hugely unexpected,” says Raimundo Nonato Mendes-Júnior, a biologist at the Chico Mendes Institute for Biodiversity Conservation in Brasilia, Brazil who wasn’t involved in the study. “It goes to show how very, very little we know about how electric eels behave in the wild.”

Group hunting is quite rare in fishes, says Carlos David de Santana, an evolutionary biologist at the Smithsonian’s National Museum of Natural History in Washington, D.C. “I’d never even seen more than 12 electric eels together in the field,” he says. That’s why he was stunned in 2012 when his colleague Douglas Bastos, now a biologist at the National Institute of Amazonian Research in Manaus, Brazil, reported seeing more than 100 eels congregating and seemingly hunting together in a small lake in northern Brazil.

Two years later, de Santana’s team returned to the lake to make more detailed observations. The nearly 2-meter-long eels lethargically lay in deeper waters during much of the day, the researchers found. But at dusk and dawn, these long streaks of black come together, swirling in unison to form a writhing circle over 100 strong that herds thousands of smaller fish into shallower waters.

Volta’s electric eels can gather in groups, working together to corral smaller fish in shallower waters, a new study finds. Then, groups of about 10 eels attack in unison, shocking the fish out of the water and into a stupor so that they can easily be eaten.

After corralling the prey, smaller groups of about 10 eels unleash coordinated electric attacks that can send shocked fish flying from the water. The researchers haven’t yet measured the combined voltage of such attacks, but 10 Volta’s eels firing together could, in theory, power something like 100 light bulbs, de Santana says. The then helpless, floating prey make easy pickings for the mass of eels. The whole ordeal lasts about two hours.

So far, such aggregations have been observed in only this one lake. But de Santana suspects that group hunting may be advantageous in other lakes and rivers with large shoals of small fish. Much of the eels’ range remains underexplored by scientists, so de Santana and colleagues are launching a citizen science project with Indigenous communities to identify more

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spots where many eels live together, he explains. “There is still so much we don’t know about these organisms.”

[sciencenews.org](https://www.sciencenews.org), 14 January 2021

<https://www.sciencenews.org>

World’s first dwarf giraffes spotted in Uganda and Namibia

2021-01-08

Giraffes are known for their height, but the first two dwarf giraffes ever discovered—one 2.8 meters tall and one 2.6 meters tall—are bucking that trend, *The New York Times* reports. The animals, found in national parks in Uganda and Namibia (above, right), were both diagnosed with skeletal dysplasia, a condition that affects bone growth, scientists reported last month in *BMC Research Notes*. (You can watch a video of the Ugandan giraffe here.) This condition, rare in wildlife, significantly shortened the giraffes’ legs—which they can’t use to run or kick effectively—but it had no effect on their long necks. ~[sciencemag.org](https://www.sciencemag.org), 8 January 2021

<https://www.sciencemag.org>

Do testicles have tastebuds? An investigation.

2021-01-22

Men across the nation have gone viral (again) for dipping their testicles in food — mostly soy sauce. Some social media stars claim they can taste the salty, umami flavor with their balls. Others say they get nothing out of it. Wait, what?

Let’s first get this out of the way: You can’t taste things with your testicles. (Sorry everyone). But — shockingly — the viral trend does have a basis in truth. Testicles do, in fact, have taste receptors. The thing is, according to a 2013 study, the taste receptors in testicles aren’t the same as those in our mouths.

“There’s a tricky little difference between taste receptors on the tongue and those in the testicle,” urologist Paul Turek told the *Huffington Post*. “The tongue responds to tastes and we decide whether food is edible. The testicle responds to ‘tastes’ as ‘chemical’ substances to decide whether to make more or less sperm and testosterone.”

Taste buds, which are found in the mouth and upper esophagus, are clusters of sensory cells with hair-like projections and thousands of taste

This condition, rare in wildlife, significantly shortened the giraffes’ legs—which they can’t use to run or kick effectively—but it had no effect on their long necks.

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receptors. The receptors send signals over nerves to the brain, and the brain translates the signals into flavors. Without the brain doing that translating, you don't actually taste sweet, bitter, sour, salty, or umami flavors. So although the testicles do contain taste receptors, they don't lead to taste because they're not connected to the brain. Besides, as far as scientists know, the taste receptors are on the inside of the testicles. Unless you inject them with soy sauce, this viral challenge wouldn't work. (Editor's Note: Please don't inject your testicles with soy sauce).

Knowing that testicles have taste receptors, the next obvious question is why? "You can just think of them like any other receptor in the body that is monitoring the environment," Emma Beckett, a molecular nutritionist at the University of Newcastle in Australia, told ScienceAlert. Taste receptors can be found throughout the body, such as in the digestive and respiratory tracts. "They might detect infections, as bacteria have sweet structural compounds and secrete bitter and sour things as waste. In the lungs and nose, there is evidence that they are involved in regulating inflammatory responses." Those in the testicles help with sperm production, and mice that are genetically altered to not have two types of taste receptors are infertile.

Of course, the nuances of the above were lost to some laymen. The first offense was a Daily Mail article from 2013 on the study that came out that same year identifying that testicles have taste receptors. The tabloid incorrectly claimed: "Scientists say that, despite being a long way from the mouth, taste receptors on the testicles and anus can also detect the savory taste of umami — the amino acid in soy sauce." Not so much.

In 2020, a female TikTok user found that article and challenged those with the relevant appendages to test it out. Men across the app were glad to dip their balls in soy sauce in the name of science. The trend quickly went viral, and some health nuts tried other foods, such as strawberries. Many men claimed they could taste through their testes, possibly because of the shock of the sensation, temperature change, and smell in the air.

"Honestly, never thought I'd have to say, trust me, I have a PhD you can't enjoy the taste of food with your testicles," Beckett tweeted in response to the viral trend. "Dip your balls in things if that's your jam, but please not for the taste receptor activation."

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fatherly.com, 22 January 2021

<https://www.fatherly.com>**Bacteria build "Iron Man" suits by soaking up toxic cobalt**

2021-01-10

Bacteria may seem like pretty simple lifeforms, but their ingenuity keeps surprising scientists. The latest example is a species called *Geobacter sulfurreducens*, which has now been found to survive exposure to toxic cobalt by building a metal "suit" like a tiny Iron Man.

The *Geobacter* genus is made up of some particularly resourceful bacteria. They can "breathe" rust, build conductive nanowires and even produce electricity, meaning they could be useful for creating microbial fuel cells that generate electricity from mud or humidity.

And now scientists at Michigan State University have uncovered a new ability. *Geobacter sulfurreducens* appears to be able to protect itself from cobalt, which is toxic to most bacteria and other organisms. The bugs essentially mine cobalt from rust, and instead of letting it penetrate through their membranes they wrap themselves in it.

"They form cobalt nanoparticles on their surface," says Gemma Reguera, lead author of the study. "They metallize themselves and it's like a shield that protects them. It's like Iron Man when he puts on the suit."

The researchers demonstrated the ability in the lab, exposing *Geobacter* to high levels of cobalt. The bacteria shrugged it off, with microscope images clearly showing the bugs shrouding themselves in the metal and continuing to thrive.

The team says that this newfound talent means the bacteria could eventually be put to work extracting cobalt from discarded lithium-ion batteries for reuse, or to soak it up in the environment. The next steps in the research are to investigate if *Geobacter* could also soak up other toxic metals – in particular, cadmium.

The research was published in the journal *Frontiers in Microbiology*.

newatlas.com, 10 January 2021

<https://www.newatlas.com>

"They metallize themselves and it's like a shield that protects them. It's like Iron Man when he puts on the suit."

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Could the novel coronavirus one day become a common cold?

2021-01-14

One day, the pandemic will end. Scientists don't know how that finale will play out but a new model offers a teaser: The deadly SARS-CoV-2 may not totally disappear but instead become a commonly circulating cold virus that just causes some mild sniffles.

This model, published Jan. 12 in the journal *Science*, is based on analyses of other coronaviruses, the majority of which cause only mild symptoms in humans. There are six known coronaviruses that infect humans; four are coronaviruses that are "endemic" or regularly circulate among human populations and cause the common cold.

The other two coronaviruses — the ones that cause severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS) — are more deadly, though the first was eliminated years ago and the latter has been largely contained.

To create their model, a group of researchers analyzed previously published data on the four milder coronaviruses and found that "infection-blocking immunity wanes rapidly, but disease-reducing immunity is long-lived," the authors wrote in the study. In other words, people can get infected over and over again, but rarely get severe disease, lead author Jennie Lavine, a postdoctoral fellow at Emory University in Atlanta, said in a statement.

PLAY SOUND

Almost everyone catches one of these endemic coronaviruses during childhood; and these early infections confer partial immunity to adults who become reinfected. "Reinfection is possible within one year, but even if it occurs, symptoms are mild and the virus is cleared from the body more quickly," Lavine said.

But there's no similar long-term data on the duration of immunity for the novel coronavirus SARS-CoV-2 that causes COVID-19. It's not clear how long immunity, whether from vaccines or natural infection, to SARS-CoV-2 will last in people; it's also unknown to what degree vaccines and natural infections will curb transmission or reduce the severity of the disease.

Some people have already been reinfected with SARS-CoV-2, Live Science previously reported. But these cases have been rare and most of these

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people have had milder disease the second time around, according to the study.

The model assumes that immunity to SARS-CoV-2 will work similarly to these other endemic coronaviruses, Lavine said. And one of the model's key conclusions is that, for existing coronaviruses, the severity of infection during the endemic phase is directly tied to how severe the disease is when it infects children. Unlike the novel coronavirus, almost no one encounters these widely circulating ones first as an adult. But "we don't really know what it would be like if someone got one of the other coronaviruses for the first time as an adult, rather than as a child," she said. It's possible that if they did, they would experience more severe disease.

Their model predicts that if SARS-CoV-2 becomes endemic, and future generations are primarily exposed during childhood, the virus "may be no more virulent than the common cold," the authors wrote. Once endemic, the virus's infection fatality ratio, or the number of people who die compared with those who are infected, will fall below that of the seasonal flu, the authors wrote.

That's because children are generally less severely impacted by COVID-19 infections and mortality is typically low in kids, so this baseline severity should predict SARS-CoV-2's severity in its endemic phase. But if SARS-CoV-2 severely impacted children, as is the case with the virus that causes MERS, then even during the endemic phase, a relatively high number of people might die, the authors predicted.

If this model holds true, exactly how the world will reach the endemic phase is still up to us: Faster virus spread will result in a quicker transition as people gain herd immunity, but it will result in more deaths. Vaccines are a safer way to achieve such immunity and once widely available, they will also accelerate the transition into a possible endemic phase — a phase in which the coronavirus may be tackled with a box of Kleenex, rather than ventilators and lockdowns.

Originally published on Live Science.

livescience.com, 14 January 2021

<https://www.livescience.com>

The molecular mechanisms that link beta carotene to lower blood cholesterol levels are poorly understood, however.

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What happens when the body cannot process beta carotene?

2020-12-16

Beta carotene is a pigment in all fruits and vegetables, and carrots and sweet potatoes are particularly rich sources.

Various findings indicate that people with high blood levels of beta carotene tend to have lower serum concentrations of the “bad” cholesterol that causes atherosclerosis — narrowing of the arteries that supply blood to the heart.

As a result, they have a lower risk of ischemic heart disease, which is the most common cause of death worldwide.

The molecular mechanisms that link beta carotene to lower blood cholesterol levels are poorly understood, however.

Now, two new studies have discovered that the body needs an active version of a certain enzyme to reap the full benefits of beta carotene for cardiovascular health.

The enzyme in question converts beta carotene into vitamin A, which reduces the amount of low-density lipoprotein (LDL) cholesterol produced in the liver.

However, up to 50% of people make a less active form of the enzyme, according to Jaume Amengual, an assistant professor of personalized nutrition at the University of Illinois at Urbana-Champaign who was involved in both studies.

Having a less active form of this enzyme makes the body less efficient at producing vitamin A from the beta carotene in fruits and vegetables.

To reap the full benefits to cardiovascular health, Amengual says, a person may need to get more vitamin A directly from animal sources, such as dairy, milk, oily fish, or cheese, for example.

Cholesterol in mice and humans

In the first study, the scientists began by measuring the impact of the enzyme, called beta carotene oxygenase 1 (BCO1), on cholesterol levels in mice. Their findings have been published in *The Journal of Nutrition*.

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The team compared the effects of a beta carotene-rich diet in one group of regular mice and another group of mice without the gene for making BCO1.

After 10 days on the diet, the mice without the enzyme had more beta carotene in their blood and higher cholesterol levels than the normal mice.

Next, the researchers analyzed DNA and blood samples from 475 healthy young adults aged 18–25. The participants also filled out questionnaires about their diets.

After factoring in the amount of beta carotene and vitamin A in the participants’ diets, the researchers discovered that those with a particular variant of the BCO1 gene had significantly lower cholesterol levels.

This genetic variant produces a more active form of the enzyme that converts more beta carotene into vitamin A.

The authors estimate that people who have one or more copies of this BCO1 gene variant could have a 9% reduction in LDL cholesterol, compared with those who do not. “Although speculative, this decrease may be clinically meaningful if maintained through adulthood,” they write.

The researchers acknowledge that one limitation of their study is that it relied on the accuracy of participants’ responses to the diet questionnaire.

It is also worth noting that this study was not intended to test the efficacy of any particular dietary intervention.

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Atherosclerosis risk

To explore whether the BCO1 enzyme could have a direct effect on the risk of atherosclerosis, the team conducted another study.

“In the human study, we saw that cholesterol was higher in people who do not produce much vitamin A,” explains Amengual, adding, “To know if that observation has an effect in the long run, we would have to wait 70 years to see if they develop [cardiovascular disease].”

Instead, the scientists fed beta carotene to two types of mice made genetically prone to develop atherosclerosis. The first type had a working version of the gene for making the BCO1 enzyme, and the other did not.

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Overall, the mice with the enzyme that converts beta carotene into vitamin A had reduced plasma cholesterol levels and developed less severe atherosclerosis than the mice without the enzyme.

The researchers traced this effect to the animals' livers. "We observed that in mice with high levels of vitamin A, the secretion of lipids [cholesterol] into the bloodstream slows down," says Amengual.

The second study has been published in the *Journal of Lipid Research*.

medicalnewstoday.com, 16 December 2020

<https://www.medicalnewstoday.com>

How do we turn oil into plastic?

2021-01-19

"Only we humans make waste that nature can't digest." Those are the words of oceanographer Capt. Charles Moore, who discovered the Great Pacific Garbage Patch in 1997. And, of course, he's talking about plastic.

Most people reading this will probably have something made of plastic within their line of sight. This material is ubiquitous: we're now producing more than 300 million tons (272 metric tons) of plastic a year, and roughly half of that is intended for single-use — meaning that it's discarded immediately after it has served its purpose. This has led to a mounting problem of plastic waste going to landfills, and some of this waste gets blown off course and makes its way into rivers and ultimately the sea. In fact, around 8 million tons (7.2 million metric tons) of plastic pollution enters the ocean every year, where it entangles marine life, pollutes coral reefs and ultimately — subjected to degradation by water, wind and sun — breaks apart into trillions of tiny microplastic pieces.

These particles of plastic look a lot like food to many marine species, who then gorge on the pollution, and end up starving from lack of real nutrition. The surface of microplastics also attract pollutants in the ocean, and end up transporting these into the bodies of animals, with effects we're still trying to understand. There's a possibility that microplastics could be harming humans as well, because we consume them via seafood and even in drinking water: in 2019, the World Health Organization called for more research into the potential impacts of microplastic pollution on our health.

Underpinning all this is the fact that, depending on the ingredients used to make it, plastic can be incredibly resilient and might never truly

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biodegrade (which for the purposes of this article, means being efficiently reduced to basic reusable compounds in nature, by the microorganisms in water and soil). Pair that with the volume of plastic pollution in our environment, and we have a clear problem. Most single-use plastics entering the ocean, for instance, will stay there for centuries.

How did we create this crisis of persistent plastic? The answer lies in the process we use to make plastic itself. But first, it's important to understand that "plastic" isn't just the shopping bags we picture floating in the ocean.

What is plastic?

"The term 'plastic' often covers a wide range of heterogeneous materials, each with differing applications that require very different physical properties," said Carl Redshaw, a chemist at the University of Hull in the United Kingdom and a participant in the university's Plastics Collaboratory project, which conducts research to improve the sustainability of the plastics industry. "In fact, more than 300 types of plastics are known," Redshaw told Live Science.

So, if plastics are so different, what do they have in common? They're made of polymers, which are molecules comprising many repeating units, in formations that give plastics many of the desired qualities — such as flexibility, malleability and strength — that they often share. Beyond that, plastics generally fall into one of two broad categories: bio-based plastics, in which polymers are derived from sources such as cornstarch, vegetable fats and bacteria; and so-called 'synthetic' plastics, in which polymers are synthesized from crude oil and natural gas.

Despite the Earth-friendly name, bio-based polymers don't automatically have a good environmental track record, because they may also persist in the environment and not biodegrade. "Not all bio-based plastics are biodegradable polymers, and not all biodegradable plastics are bio-based," Redshaw explained. Nevertheless, oil- and natural gas-derived materials comparably cause the starkest environmental harm, because plastics in this category tend to persist in the environment for longer — while causing other environmental impacts, too.

To understand why, we're going to look at an example of oil-derived plastic: take the milk bottle chilling in your fridge. This carton begins its life somewhere far more dramatic — deep in the bowels of the Earth, as crude oil. This substance, pooling in high-pressure chambers within the Earth's crust, is drilled and pumped to the surface and carried through pipelines to oil refineries. Its dense sludge is made up of hydrocarbons, compounds

This material is ubiquitous: we're now producing more than 300 million tons (272 metric tons) of plastic a year, and roughly half of that is intended for single-use — meaning that it's discarded immediately after it has served its purpose.

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made from combinations of carbon and hydrogen atoms that form chains of varying lengths, giving them different properties. These hydrocarbons are the earliest raw materials of plastic, ready-made by the Earth.

At the refinery, plastic production is truly set in motion. Here, molasses-like crude oil is heated over a furnace that separates the hydrocarbons into different groups— based on the number of atoms they contain and their resulting molecular weight — and then feeds them into a nearby distillation tube. Inside this tube, the longer, typically heavier hydrocarbons sink to the bottom, while the shorter, lighter ones rise to the top. The result is that crude oil gets separated into several distinct groups of chemicals for use — such as petroleum, gasoline and paraffin — each of which contains hydrocarbons of a similar weight and length. One of these groups is naphtha, a chemical that will become the primary feedstock for making plastic.

Naphtha is like gold dust for plastic production, because two of the many hydrocarbons it contains are ethane and propene. These two compounds are crucial to the formation of the most commonly produced and ubiquitous plastic products on Earth, including the type used for that milk carton. But to be made into something that can actually be used to build plastic, ethane and propene have to be broken down from their raw hydrocarbon state into smaller units.

There are different ways to do this. One method is to apply high heat and high pressure in a zero-oxygen environment. This process, called “steam cracking,” breaks down the hydrocarbons into shorter molecules called monomers.

“Monomers such as ethylene from ethane, or propylene from propene, can be derived straight from naphtha after thermal cracking,” (which incorporates steam cracking), said Payal Baheti, a postdoctoral researcher at Aston University focusing on sustainable polymer materials. The simplified ethylene and propylene, finally, are the precious ingredients needed to make plastic’s backbone.

This next step unfolds through a process called polymerization, wherein those individual monomer ingredients are combined chemically in new arrangements to produce the long repeating chains known as polymers. In this case, ethylene and propylene form polyethylene and polypropylene — the two most common and widely produced polymers on Earth.

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So, why are these two polymers so popular? Polyethylene’s makeup allows it to be used to make plastics of different densities — meaning it can be flimsy and pliable, or sturdy and tough — thus making its applications extremely diverse. Meanwhile, polypropylene’s configuration makes it particularly flexible and resilient. Consequently, we see these types of plastic every day, predominantly in single-use items such as the milk carton, not to mention plastic wrappers, straws, water bottles, shopping bags, shampoo containers, bottle caps — the list goes on.

Yet, these are just two varieties of synthetic plastics out of many dozens more. Other types of hydrocarbons are isolated and broken down from different sources — not only from crude oil but also from natural gas — and are used to make plastic, too. In some cases, polymers might be made of a single monomer, repeated, as we see in polyethylene and polypropylene, or they might involve combinations of a few types of monomers.

What’s more, each of those polymer chains will then be processed in a variety of ways and mixed with various additives — antioxidants, foaming agents, plasticizers, flame retardants — that equip them to fulfill the variety of niche functions that make plastics so versatile.

“Different plastics need to have different properties,” Baheti told Live Science. “Take the example of food packaging, which should deter the passage of excess oxygen or sunlight, to avoid degradation, so it contains additives to make it so.” “One could say it’s the additives that give a polymer its properties and leads to the formation of a plastic.”

These final flourishes create the huge diversity of plastic products we have today — and that make enormous contributions to food production and storage, cosmetics, technology, medicine and health care.

“Alien material”

Now, let’s fast-forward through that production process once more. Plastic that’s synthesized from oil and natural gas is made by isolating hydrocarbons, breaking them down into their component parts and then reconstituting these parts into entirely new formations never before seen in nature. Simply speaking, this creates an “alien” material unfamiliar to microbes in Earth’s water and soil, Baheti explained. “The carbon backbone found in synthesized plastic is not recognized by soil’s bacteria, meaning they cannot digest and convert it into water and carbon dioxide.”

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“The likes of polyethylene can take centuries to decompose in landfill sites,” Redshaw said. “This means much of what has been produced during our lifetime still remains in its near original form. And persistence isn’t the only issue: as it gradually breaks apart under the influence of sunshine, water and wind, oil- and natural gas-derived plastic releases greenhouse gas emissions contained within, as well as leaching the chemicals added during production back into the environment. The sheer volume of single-use plastic pollution, especially — combined with its persistence and an ongoing environmental impact that can last for centuries — has created the environmental catastrophe we see today.

But there may be a way out of this mounting pile of trash. Redshaw believes biodegradable plastics — which are a focus of his research — could be one potential solution. To rehash, making biodegradable plastic doesn’t necessarily mean producing it from bio-based sources like corn starch (although that could provide a solution). More specifically, it entails making plastic from polymers that can be broken down reasonably efficiently by microbes in water and soil.

For this to have real planetary impact, biodegradable polymers would need to replace the likes of oil-based polyethylene and polypropylene — but while also maintaining properties like strength and flexibility that make these conventional polymers so desirable. That’s a tall order, made trickier by the fact that conventional polymers remain competitively cheaper to make.

But a few biodegradable options are starting to make headway. One is a type called polylactides, which are being used to make single-use items such as cups, cutlery and straws, that could biodegrade more effectively once they’re in the environment. These kinds of inventions are likely to increase as global pressure grows to make plastic more sustainable, Redshaw reckoned.

There are hints of optimism elsewhere, too. In 2016, researchers discovered plastic-eating bacteria, and others have since identified polyethylene-munching worms (this beastie is a caterpillar of the greater wax moth, Live Science previously reported). They’ve also found enzymes that can be engineered to break down plastic waste.

“Maybe, in the years ahead, we will learn from the bacteria and worms that possess the ability to break down and digest plastics, even stuff like polyethylene carrier bags, and design large, artificial worms that can eat their way through our plastic waste — like the giant maggots that featured in ‘Doctor Who’ back in the ‘70s!” Redshaw said.

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In any case, in the process of creating plastic, humans have managed to take raw materials from nature and transform them so thoroughly that nature no longer recognizes them. Our ingenuity is what got us in this mess; now, hopefully, it can get us out.

Originally published on Live Science.

[livescience.com](https://www.livescience.com), 19 January 2021

<https://www.livescience.com>

How mRNA vaccines work

2020-12-16

The first COVID vaccine to be rolled out in the U.S., the one from Pfizer and BioNTech, is an mRNA vaccine. The second one probably will be too: Moderna’s vaccine is up for consideration this week. We’ve never had an mRNA vaccine in common use before, so you’re not alone if you’re wondering what the hell this technology is, and whether it has something to do with DNA.

To answer the most common questions: no, it doesn’t change your DNA. No, it’s not an unproven technology (it’s actually been in the works for decades). And the CDC has a fact sheet here with the basics you need to know about the new technology.

But here’s the very short version: the mRNA in the vaccine contains instructions to tell our body how to build a coronavirus spike protein. As soon as we do that, our immune system freaks out, as it’s supposed to, and creates antibodies to the spike protein. The mRNA is destroyed shortly after the injection, but the antibodies stick around. They can then recognize the real virus if we ever encounter it in the wild.

Want the longer, more detailed version? Here we go.

Our cells contain DNA and are continually making mRNA

Let’s start with a quick refresher on what it means to have genetic material. The DNA that we have, as humans, is contained in (almost) every cell of our body. It includes instructions for everything a cell might have to do. Processing food, growing more cells, releasing hormones—anything that happens in your body happens because your cells are following recipes encoded in your DNA.

Every time our cells use one of those recipes, the information in the DNA needs to be copied first. That copy, instead of being another piece of

But here’s the very short version: the mRNA in the vaccine contains instructions to tell our body how to build a coronavirus spike protein.

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DNA, is a slightly different type of molecule called RNA. (It's sort of like if DNA were a collection of reference books in a library. You can't check the book out, since it needs to stay in the library, but you can write down the information you want in a notebook, and take that with you. The notebook paper is RNA.)

Copying DNA to make RNA is a process called transcription, and the next step is often translation: using the RNA instructions, now called mRNA, to make a protein. Proteins form much of the structure of our bodies, and little machines made of proteins perform nearly all our bodily functions. We are constantly making mRNAs and using these mRNAs to make proteins. All the time.

The "m" in mRNA means "messenger," and it refers to the type of RNA we're talking about here, the ones that carry information from DNA to the protein-making machinery. (There are many other RNAs in the world, but let's not get too off track.)

The wild coronavirus contains RNA instructions to build itself

Before we talk about the vaccine, let's look at how the virus that causes COVID, SARS-CoV-2, works in the wild. Viruses are smaller and simpler than any of our cells, and many scientists will argue that they aren't "alive" in the same way that people or even bacteria are.

A virus is made of proteins, sometimes encased in a lipid (fatty) envelope. The proteins themselves make up the spiky ball shape of the coronavirus. The red nubs on that iconic illustration you've seen are the spike proteins, but more about them later. There are 28 other proteins that form the rest of the virus.

And inside that spiky ball? There is a single, long strand of RNA. This RNA is the virus's genome, and it contains instructions to build all 29 of the proteins in the virus itself.

When the virus infects our cells, our own protein-making machinery translates the viral RNA and makes the proteins it calls for. We've been tricked; we just made a bunch of virus parts. Those parts assemble into new viruses, each with their 29 proteins and a fresh copy of their RNA, and then they're off into the world to infect more cells.

(Again, I'm giving you a very streamlined summary of what happens; this paper from Nature describes the coronavirus life cycle in all its nerdy detail.)

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mRNA vaccines give our cells instructions to build the spike protein

A traditional vaccine would include at least one protein from the virus or bacterium it's targeting, possibly an entire virus that has been inactivated or weakened so that it can't replicate. But an mRNA vaccine does things differently.

This vaccine gives us no proteins at all, just a little lipid bubble (similar to the micelles in micellar water, the makeup cleanser) encasing an RNA with instructions on how to make the spike protein. These instructions are even formatted as a nice human-style mRNA, instead of the special tricky structure of viral RNA.

With these instructions, our cells can then make the spike protein (a bunch of those red nubs), but that's it. The other 28 proteins are absent. So we won't accidentally make any viruses.

Our immune system can then respond to the spike protein

After making the spike protein, cells can put the spike proteins on their outsides, where immune system cells can interact with them. Our immune system recognizes the spike proteins as foreign and not part of ourselves, and it mounts an immune response against them.

The immune response may include soreness, fever, or fatigue. But you're not sick; your immune system is just responding to the spike protein and gearing up to be able to recognize it in the future.

The mRNA from the vaccine quickly disappears

The mRNA from the vaccine doesn't stick around. Just as our cells are always making mRNAs, they are also constantly destroying them. mRNA is a temporary messenger, used and trashed within seconds of being made.

Although RNA and DNA are both nucleic acids, and both are "genetic material" in a sense (DNA is our genetic material, RNA is the virus's genetic material), the mRNA cannot become part of our DNA and it does not do anything to change our DNA. It's a different type of molecule, in a different part of the cell.

Why mRNA vaccines?

Several types of vaccines are being tested for COVID. Many use traditional technologies, like modifying a cold virus so that it cannot replicate, and so it also includes a coronavirus spike protein.

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But mRNA vaccines work particularly well in this situation because they can be made so fast. If you want to make a bunch of doses of a vaccine, you need to actually grow those viruses somehow. The flu vaccine has famously been grown in chicken eggs, for example.

mRNA vaccines are quicker because you don't need any kind of cells to manufacture them. The technology for mRNA vaccines has been in the works for many years, and 2020 just happened to be their time to shine. If you'd like to read more on how the vaccine was developed so quickly, we have an explainer on that here.

[vitals.lifehacker.com](https://www.vitals.lifehacker.com), 16 December 2020

<https://www.vitals.lifehacker.com>

Why you absolutely must reduce, repair, or recycle your e-waste

2020-12-22

What inspired you to bring the issue of e-waste to the forefront with the short film, Silicon Mountain?

In 2013, my company engaged with a struggling client that opened our eyes to a hidden mountain of electronic waste. We saw the e-waste industry as an opportunity to do good by helping clients improve their ability to refurbish more electronics and properly recycle what's left. A short-format documentary felt like the perfect way to bring awareness to a large audience. We had never made a short film before. The experience was both invigorating and exhausting--but we would do it again in a heartbeat.

What surprising facts did you learn about e-waste?

416,000 smartphones are thrown away globally each day!

80 to 85 percent of e-waste finds its way into landfills or incinerators where its toxic metals including cadmium, mercury, lead, chromium and nickel are leached into the groundwater or released into the air, poisoning people and animals

22 to 55 million tons of e-waste are discarded each year; that's comparable to throwing away 1,000 laptops every second

**416,000 smartphones
are thrown away
globally each day!**

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In the US alone, we throw \$344 million in gold, \$46 million in silver, and \$10 million in copper into the trash, just from the cellphones we drop into the garbage each year

What challenges do entrepreneurs in the e-waste recycling space confront?

Electronics recyclers see a very complex stream of waste materials coming into their recycling centers. These include anything with a circuit board: mobile devices, traditional desktop computers, rechargeable devices, printers, cell phones, industrial control boards, DVD players, video games and every other imaginable device. They span the timeframe from old-school computers from the 1980s to AirPods made in 2020. All in one truck. How do you even start to process such an astonishing range of materials?

The foundational component of any enterprise resource planning (ERP) system is an individual item. But e-waste recyclers can't start with an item because each truck delivers such a massive variety of e-waste. The e-waste recyclers don't know what's in the supply truck, but it's their job to start processing every item immediately.

If an ERP system is based on items--and you don't know what those items are--you need a business management system like reVESTED that can essentially work in reverse to accommodate the complexity of the process.

Tell us about reVESTED.

We built reVESTED 100 percent on the Oracle NetSuite platform to provide the necessary functionality to support every area of an e-waste recycling business: accounting, order-taking, inventory control, and every other process. With reVESTED, we designed an ERP system to give electronics recyclers the means to "create" an item within the system on the fly. It also features a cleanup process so administrators can verify that each item was captured correctly.

The cloud-based solution helps empower e-waste processors to receive items, repair them, and sell them back into the secondary electronics industry to make money. That sustainability in their business model ensures they can continue to do what's good for all of us--and the planet.

What actions can consumers and entrepreneurs take to lower e-waste generation?

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We invite you to put a new spin on an old recycling catchphrase--instead of reduce, reuse, recycle, we like to say reduce, repair, recycle.

Reduce. First, reduce the amount of upgrading you do with the electronics in your life. Just because a new version comes out doesn't mean you need to replace your current version.

Repair. Next, repair or refurbish electronics when possible. You'd be surprised at the new life you can breathe into an item with a simple battery replacement. In 2018, over 10 million people accessed iFixit's guides to replace the batteries on their iPhones.

Recycle. If a repair is not feasible, then look up your local certified e-waste recycler and recycle your electronics responsibly.

Less than 20 percent of global e-waste is formally recycled. It takes over 200 pounds of raw material to make the cell phone in your pocket. The goal is to make sure we don't have to continue to extract more and more precious minerals from the Earth to feed the supply chain of new products. There's a plethora of those materials available in items that may be sitting unused in your drawer.

By working together, we can adopt a more practical, sustainable solution to protect our planet and its resources for future generations.

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Technical Notes

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(NOTE: OPEN YOUR WEB BROWSER AND CLICK ON HEADING TO LINK TO SECTION)

CHEMICAL EFFECTS

[Characterization of the role of esterases in the biodegradation of organophosphate, carbamate, and pyrethroid pesticides](#)

ENVIRONMENTAL RESEARCH

[Valuating environmental impacts from ship emissions - The marine perspective](#)

[Association between particulate matter air pollution and risk of depression and suicide: a systematic review and meta-analysis](#)

[Contaminants of emerging concern in aquatic environment: Occurrence, monitoring, fate, and risk assessment](#)

OCCUPATIONAL

[Organophosphate pesticide exposure, hormone levels, and interaction with PON1 polymorphisms in male adolescents](#)

[Heavy Metal Exposure Leads to Rapid Changes in Cellular Biophysical Properties](#)

[Occupational exposure of rural workers to pesticides in a vegetable-producing region in Brazil](#)

PHARMACEUTICAL/TOXICOLOGY

[Quantification of systemic o-toluidine after intrathecal administration of hyperbaric prilocaine in humans: a prospective cohort study](#)

[Carcinogenicity and chronic toxicity of acrolein in rats and mice by two-year inhalation study](#)

[Assessment of the Influence of Crystalline Form on Cyto-Genotoxic and Inflammatory Effects Induced by TiO₂ Nanoparticles on Human Bronchial and Alveolar Cells](#)