CHEMWATCH

Bulletin Board

Contents

FEB. 04, 2022

(click on page numbers for links)

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CHEMWATCH

Bulletin Board

Contents

FEB. 04, 2022

GOSSIP

CURIOSITIES

TECHNICAL NOTES

CHEMWATCH

Bulletin Board

Contents

FEB. 04, 2022

ASIA PACIFIC

Philippines targets an 80% reduction in HFCs by 2045

2021-12-21

Baseline consumption levels to be frozen from 2024

The Philippines' Department of Environment and Natural Resources (DENR) has issued a chemical control order (CCO) for hydrofluorocarbons (HFCs), committing to an 80% reduction in importation by 2045.

CCOs in the Philippines either restrict, ban or gradually phase out substances. They are issued for chemicals that pose an unreasonable risk to public health and the environment.

Published on 13 October, the CCO (DAO No. 2021-31) sets out the following HFC phase-out schedule:

2024 – freeze baseline consumption at the average annual levels from 2020-22 + 65% of HCFC baseline production/consumption – in accordance with Kigali Amendment (see box);

2029 – reduce baseline consumption by 10%;

2035 – reduce baseline consumption by 30%;

2040 – reduce baseline consumption by 50%; and

2045 – reduce to 80% of baseline, importation of the remaining 20% permitted for the servicing sector.

CCOs in the Philippines either restrict, ban or gradually phase out substances.

The DENR CCO stipulates:

reducing the risk of HFC exposures to human health and the environment;

increasing awareness on their toxicity, as well as the availability of technically superior and safer alternatives; and

ensuring the proper implementation of the existing framework and introducing appropriate prevention-based programmes to mitigate, reduce and eliminate their risks.

The Order covers all 18 HFCs included in Annex F of the UN's Montreal Protocol on Substances that Deplete the Ozone Layer.

The Philippines does not produce or export them. The Environmental Management Bureau (EMB) will establish an import quota allocation system in 2024. Only companies that imported HFCs from 2020-22 will be granted quota allocations and permitted to apply for a certificate of registration (COR) and pre-shipment importation clearance (PSIC).

HFC importers, dealers, resellers, retailers and service providers will be required to register with the EMB.

Read More

Chemical Watch, 9 December 2021

https://chemicalwatch.com/387409/philippines-targets-an-80-reduction-in-hfcs-by-2045

A more efficient agvet chemical regulator

2021-12-02

- **Agricultural and Veterinary amendments have passed Parliament**
- **Bill streamlines the Australian Pesticides and Veterinary Medicines Authority and establishes a new governance board**

New laws passed in Parliament will improve the efficiency of the Australian Pesticides and Veterinary Medicines Authority (APVMA) and speed up the process to access chemical products.

Minister for Agriculture and Northern Australia David Littleproud said agricultural chemicals and veterinary medicines are critical to Australian agriculture.

"Agvet chemicals protect our crops, our livestock and our pets. They help protect the environment by keeping invasive weeds and pests at bay," Minister Littleproud said.

"The APVMA has an important role to make sure agvet chemicals are safe and don't impact our market access.

"This means that the APVMA needs to be efficient and effective and we need to give them the legislative tools to achieve that.

"This Bill aims to streamline regulation for the APVMA, encourage the registration of more minor uses and strengthen protections to the community – all while improving governance.

"The APVMA has an important role to make sure agvet chemicals are safe and don't impact our market access.["]

"The APVMA needs to have flexibility in the way they operate. Some simple, practical changes will mean the APVMA runs more efficiently, will reduce some costs, and will mean that farmers can access safe and effective chemicals quickly.

"The Bill also means a new APVMA Board, will be established to guarantee the performance and accountability of the APVMA.

"I couldn't be prouder to be part of a government that has delivered these important improvements and efficiencies for farmers."

Fast Facts:

- **Agricultural and Veterinary Chemicals Legislation Amendment (Australian Pesticides and Veterinary Medicines Authority Board and Other Improvements) Bill 2019 passed the Parliament on 1st December.**
- **The Australian government has committed to paying for the establishment costs for the board and paying for the initial two years of operation.**
- **Key features in the Bill included:**
- **establishing a governance Board for the APVMA**
- **enabling simpler regulatory processes for chemicals of low regulatory concern,**
- **providing for extensions to limitation periods and protection periods as an incentive for chemical companies to register certain new uses of chemical products; and**
- **puts in place additional penalties and information requirements aimed at improving the integrity of the system for users and the community.**

Read More

Australian Government, 2 December 2021

https://minister.awe.gov.au/littleproud/media-releases/agricultural-veterinary-chemicals-legislation-amendment-bill-2019

AMERICA

Federal PFAS cleanup regulation on the horizon

2021-12-02

Federal regulators recently picked up the pace in controlling the class of persistent environmental toxins known as PFAS, as the nation's eyes increasingly focus on this problem. Local governments, airports, and potentially responsible parties should pay particularly close attention to these developments.

On October 25, the EPA announced plans to add four types of Per- and Polyfluoroalkyl Substances (PFAS) to the Resource Conservation and Recovery Act's (RCRA) Hazardous Constituent List (HCL), 40 CFR Part 261 Appendix VIII. Any substances on the Hazardous Constituent List are automatically regulated under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). 42 U.S.C. § 103. This new designation opens the door for the EPA to issue reporting thresholds and cleanup requirements as minimum standards for PFAS releases nationwide.

This new designation opens the door for the EPA to issue reporting thresholds and cleanup requirements as minimum standards for PFAS releases nationwide.

This forthcoming regulation has a wide reach—PFAS is a broad category of synthetic chemicals found in many household and commercial items. While there are over 40,000 different types of PFAS, EPA proposes to regulate four of the most significant—PFOA, PFOS, PFBS and GenX—which encompass the chemicals commonly used in stain- and water-repellant fabrics, non-stick surfaces such as cookware, and in fire-fighting foam (aqueous film forming foam).

CERCLA is designed to remedy threats to human health and the environment caused by releases of hazardous materials. Importantly, CERCLA is retroactive, meaning if a hazardous material was spilled a long time ago, but the substances still remain in the environment and still pose a risk to human or environmental health, the current property owner will be responsible for paying to clean up the materials (until and unless they can find another entity that should be responsible instead.)

Currently, only a few states (including Massachusetts) regulate PFAS as hazardous materials and have set maximum contaminant levels for PFAS

in drinking water. The prospect of robust federal regulation by EPA means that cleanups may be required despite the absence of state standards. State mandated cleanup thresholds for health and environmental protection are rare, so the addition of PFAS to RCRA and in turn, CERCLA, means that states with no reporting or cleanup requirement will be subject to the new federal standards.

EPA's announcement was only the first step to include four types of PFAS on the HCL, so final, binding regulations and maximum contaminant levels for these types of PFAS could remain years away. Next, EPA will evaluate existing data to establish a record to support the proposed rule. Then, EPA will initiate the rulemaking to include four common PFAS compounds on the HCL. Once on the HCL, if any of these substances are detected in water or soil above the designated reportable thresholds EPA will impose, that site becomes subject to CERCLA's onerous reporting and cleanup requirements.

This is the Biden Administration's second effort to begin addressing PFAS through regulations. On March 3, 2021, EPA made a determination to regulate PFOA and PFOS with a National Primary Drinking Water Regulation under the Safe Drinking Water Act, 42 U.S.C. § 300f-300j. EPA will initiate the process to propose the drinking water regulations for PFOA and PFOS by March 3, 2023.

The addition of PFAS to RCRA and CERCLA will have a resounding effect on industries and property owners coast-to-coast. It lays the groundwork for the EPA to have nationwide reach on PFAS regulation and gives the EPA the ability to adjust maximum contaminant levels and reporting thresholds. New reporting and cleanup requirements will result in an increase in cleanup liability, cleanup costs, culpable parties, and the sheer number of hazardous waste sites.

Read More

JDSupra, 2 December 2021

https://www.jdsupra.com/legalnews/federal-pfas-cleanup-regulation-on-the-6719516/

Chile unlikely to pass water department bill before March

2021-12-02

The bill that would create a water resources department and increase water's importance within the public works ministry (MOP) is unlikely to be passed by Chile's congress before the new government takes office on March 11, according to public works minister Alfredo Moreno (pictured).

The senate's public works committee began reviewing the bill in July, but over the last few weeks the upper chamber has been prioritizing more urgent legislation, Moreno told BNamericas. The bill also needs to go the lower house.

However, he also said there is cross-party support for some of the central aspects of the bill, which would centralize the coordination of Chile's water policies. It would also rebrand the MOP as the public works and water resources ministry.

"We can discuss what is the precise form or the attributions that this ministry could take, but I believe that the general idea has a lot of support, so I expect that, whoever the new president is, work will continue to make this a reality," Moreno said.

The bill also needs to go the lower house.

The minister made the comments during the Expo Agua Santiago event.

Moreno added that it is very important to have a coordinated water policy since even regions in the south, which were previously considered free from the drought affecting the country for over a decade, are now seeing less rain than normal.

Earlier this year water scarcity was declared in Los Lagos region, and it was followed this week by neighboring Los Ríos region.

"All studies show that Chile has very dispersed organizations, with not a lot of strength to coordinate, and that requires an organization to coordinate it, not just the MOP, but also having a ministerial committee, a national council, having a national water policy," Moreno added.

Read More

BNAmerica, 2 December 2021

https://www.bnamericas.com/en/news/chile-unlikely-to-pass-bill-to-create-water-department-before-march

Petition to revoke food tolerances and cancel registrations for organophosphate pesticides filed

2021-12-09

On November 18, 2021, the United Farm Workers and several other non-governmental organizations (NGO) filed a petition with the U.S. Environmental Protection Agency (EPA) to revoke all food tolerances and cancel registrations for organophosphate (OP) pesticides (Petition). The Petition was filed pursuant to the Federal Food, Drug, and Cosmetic Act (FFDCA), 21 U.S.C. Section 346a(d), the Administrative Procedure Act (APA), 5 U.S.C. Section 551, and the First Amendment Constitutional Right to Petition.

The Petition seeks final EPA actions to revoke tolerances and cancel registrations for 15 OPs by the registration review deadline of **October 1, 2022**.

The Petition seeks final EPA actions to revoke tolerances and cancel registrations for 15 OPs by the registration review deadline of October 1, 2022.

The Petition also states that EPA must take the following actions:

- Update EPA's human health risk assessments (HHRA) for OP pesticides to use a regulatory endpoint that the Petition claims will protect children from learning disabilities and other neurodevelopmental harm.
- Complete Endangered Species Act (ESA) consultations and ensure its registrations comply with the ESA;
- Conduct endocrine disruptor screening of all pesticides.
- Complete a cumulative risk assessment for all the OPs to address their cumulative acute poisoning and neurodevelopmental effects.

The Petition focuses on 15 OPs that are currently going through registration review:

- Acephate (EPA-HQ-OPP-2008-0915);
- Bensulide (EPA-HQ-OPP-2008-0022);
- Chlorethoxyfos (EPA-HQ-OPP-2008-0843);
- Chlorpyrifos-methyl (EPA-HQ-OPP-2010-0119);
- Diazinon (EPA-HQ-OPP-2008-0351);

- Dichlorvos (EPA-HQ-OPP-2009-0209);
- Dicrotophos (EPA-HQ-OPP-2008-0440);
- Dimethoate (EPA-HQ-OPP-2009-0059);
- Ethoprop (EPA-HQ-OPP-2008-0560);
- Malathion (EPA-HQ-OPP-2009-0317);
- Naled (EPA-HQ-OPP-2009-0053);
- Phorate (EPA-HQ-OPP-2007-0674);
- Phosmet (EPA-HQ-OPP-2009-0316);
- Terbufos (EPA-HQ-OPP-2008-0119); and
- Tribufos (EPA-HQ-OPP-2008-0883).

Commentary

Now that EPA is in receipt of the Petition, it must determine that it has received a "complete" petition to revoke a tolerance based on criteria set forth in EPA's regulations (40. C.F.R. § 180.7). If EPA determines the Petition is complete, it will publish in the *Federal Register* within 30 days a notice of filing for the Petition, which must include the informative summary of the Petition submitted by the petitioner. FFDCA Section 408(d)(3). A public comment period follows.

Generally, the Petition is an important signaling document that the petitioners use to outline how EPA should approach the **2022** registration review deadline for these OP products. It signals that unless EPA completes all elements of a registration review, including a complete ESA assessment and an endocrine disruptor review -- which may be impossible for EPA to complete -- then EPA should act now to revoke OP tolerances in light of arguments contained in the Petition. It stresses the environmental justice commitments announced by the Biden Administration, arguing that evidence is clear, in their view, of the need to take immediate action to end OP use across virtually all of the members of the class. It seems to anticipate that even if EPA rolls out registration reviews of the individual OP pesticides before the deadline, there will likely be comment and debate about the specific analyses and evaluation of each member of the category. This would additionally delay the completion of any revised cumulative risk assessment for the OPs.

Read More

Pesticide Law and Policy Blog, 9 December 2021

http://pesticideblog.lawbc.com/entry/petition-to-revoke-food-tolerances-and-cancel-registrations-for-organophosp

California to conduct compliance check for PFASs in carpets, rugs next year

2021-12-16

California's Department of Toxic Substances Control (DTSC) has said it intends to start an enforcement effort in 2022 to ensure that companies are no longer selling carpets and rugs containing per- and polyfluoroalkyl substances (PFASs) in the state.

The agency's Safer Consumer Products (SCP) programme confirmed the plan last week. PFASs in carpets and rugs became a priority product under the scheme this summer, requiring businesses to either stop using the compounds or inform the agency that they will do an alternatives assessment to identify safer replacements.

The agency's Safer Consumer Products (SCP) programme confirmed the plan last week.

The DTSC told Chemical Watch that because they received no notifications of this by the 30 August cutoff, the agency will sample and scrutinise items on the market to make sure they are PFAS-free. "If PFASs are detected, additional enforcement actions will be taken," it said.

In 2019, the agency carried out similar testing for the flame retardants TDCPP and TCEP in children's foam-padded sleep products, the green chemistry scheme's first priority product. That analysis verified that manufacturers had phased out the compounds.

Read More

Chemical Watch, 12 December 2021

https://chemicalwatch.com/393241/california-to-conduct-compliance-check-for-pfass-in-carpets-rugs-next-year

EUROPE

Reminder – upcoming GB active substance renewal submission deadlines. Apply for active substance renewal by the deadlines to keep products on the GB market

2022-01-22

Under the GB BPR, active substance approvals will expire unless a renewal application is submitted at least 550 days before their expiry date.

The 550-day deadlines are coming up for the following active substance/ product type combinations under GB BPR:

- 2,2-dimethyl-1,3-benzodioxol-4-yl methylcarbamate (Bendiocarb) (CAS 22781-23-3 EC 245-216-8) in product type 18
  30 July 2022
- Copper (II) hydroxide (CAS 20427-59-2 EC 243-815-9) in product type 8
  30 July 2022
- Copper (II) oxide (CAS 1317-38-0 EC 215-269-1) in product type 8
  30 July 2022
- Copper (II) carbonate - copper (II) hydroxide (1:1) (Basic Copper carbonate) (CAS 12069-69-1 EC 235-113-6) in product type 8
  30 July 2022
- 1-(4-chlorophenyl)-3-(2,6-difluorobenzoyl)urea (Diflubenzuron) (CAS 35367-38-5 EC 252-529-3) in product type 18
  31 July 2023
- 4-phenoxyphenyl (RS)-2-(2-pyridyloxy)propyl ether (Pyriproxyfen) (CAS 95737-68-1 EC 429-800-1) in product type 18
  31 July 2023
- Alkyl (C12-16) dimethylbenzyl ammonium chloride (ADBAC/BKC (C12-16)) (CAS 68424-85-1 EC 270-325-2) in product type 8
  31 July 2023
- Didecyldimethylammonium chloride (DDAC) (CAS 7173-51-5 EC 230-525-2) in product type 8
  31 July 2023
- Formaldehyde (CAS 50-00-0 EC 200-001-8) in product types 2 and 3
  31 July 2023

Any person, company or taskforce/consortium can support an active substance/ product type combination for renewal – it doesn't have to be the original supporter.

- Powdered corn cob (CAS n/a EC n/a) in product type 14
  31 July 2023
- Thiamethoxam (CAS 153719-23-4 EC 428-650-4) in product type 18
  31 July 2023

Any person, company or taskforce/consortium can support an active substance/product type combination for renewal – it doesn't have to be the original supporter.

Check the GB Article 95 List to see who the original supporters were.

If a renewal application is not submitted for the above active substance/product type combinations under GB BPR, the approvals will expire. This means the active substances can no longer be used in biocidal products of the relevant product types in Great Britain.

Read More

HSE, 22 January 2022

https://www.hse.gov.uk/

Peer-reviewed study finds chemicals in plastics induce adipogenesis

2022-01-26

In an article published on January 26, 2022, in the peer-reviewed journal *Environmental Science & Technology*, Johannes Völker from the *Norwegian University of Science and Technology (NTNU)*, Trondheim, Norway, and co-authors investigated chemicals contained in plastic products for their adipogenic activity, i.e., promotion of obesity. For their study, the researchers selected 34 plastic products with and without food contact and made of several polymer types that had been previously assessed for their unspecific toxicity and endocrine activity (FPF reported). Upon extraction experiments with methanol, they applied the samples to an *in vitro* adipogenesis assay with murine 3T3-L1 cells and nontarget high-resolution mass spectrometry (LC- QTOF-MS/MS).

Völker et al. reported that one-third of the samples induced adipogenesis. The products made of polyvinyl chloride (PVC) and polyurethane

Völker et al. reported that one-third of the samples induced adipogenesis.

(PU) most consistently contained chemicals with adipogenic activity, while those made of polyethylene terephthalate (PET), high-density polyethylene (HDPE), and polylactic acid (PLA) did not induce an adipogenic response. To evaluate the mechanism underlying the response, Völker and co-authors further tested the extracts' activity at the human peroxisome proliferator-activated receptor gamma (PPARγ) and glucocorticoid receptor (GR) since these receptors are key regulators of adipogenesis and lipid metabolism, respectively. However, most extracts did not activate these two receptors. Thus, the scientists believe that other mechanisms induce the adipogenic effects, which still need to be explored.

Concerning the chemical composition of the plastic extracts, Völker et al. detected over 55,000 chemical features in the 34 samples of which they tentatively identified 629 compounds. A comparison with known metabolism-disrupting chemicals (MDCs) showed that 11 of the 629 are known MDCs. These included four phthalates and six organophosphates. The authors concluded "that daily-use plastics contain potent mixtures of MDCs and can, therefore, be a relevant yet underestimated environmental factor contributing to obesity."

Read More

Food Packaging Forum, 26 January 2022

https://www.foodpackagingforum.org/news/peer-reviewed-study-finds-chemicals-in-plastics-induce-adipogenesis

INTERNATIONAL

Rwanda labelling of chemicals – requirements

2022-01-21

This Draft Rwanda Standard specifies the requirements for the labelling of chemicals. It applies to pure substances and their dilute solutions and to mixtures, to hazardous substance or mixture includes pictograms, signal words, hazard statements, precautionary statements, and supplemental statements. It does not include requirements for testing substances or mixtures. It does not apply to medical or veterinary products, cosmetics, munitions or explosives, pesticides, waste and foodstuffs or animal feedstuffs in the finished stage.

It does not include requirements for testing substances or mixtures.

Read More

WTO, 21 January 2022

https://members.wto.org/crnattachments/2022/TBT/RWA/22_0675_00_e.pdf

OECD Tour de Table includes update on nano developments in the United States

2022-01-26

The Organization for Economic Cooperation and Development (OECD) has published the latest edition of the Developments in Delegations on the Safety of Manufactured Nanomaterials — Tour de Table. The *Tour de Table* compiles information provided by delegations on developments concerning the safety of manufactured nanomaterials. It includes the following information on developments in the United States.

- The U.S. Environmental Protection Agency (EPA) completed review of two low volume exemptions for a modified graphene substance and a modified titanium dioxide substance. According to the *Tour de Table*, EPA allowed the exemptions under conditions that limited human and environmental exposures to prevent unreasonable risks. Additionally, EPA reviewed and completed a significant new use notice (SNUN) for a carbon nanotube substance. EPA regulated the new chemical substance with a consent order "owing to limited available data on nanomaterials"; the consent order limited uses and human and environmental exposure to prevent unreasonable risks.
- The National Institute for Occupational Safety and Health (NIOSH) assessed potential health risk from occupational exposure to silver nanomaterials and derived a recommended exposure limit (REL) for silver nanomaterials (less than 100 nanometers (nm) primary particle size) of 0.9 micrograms per cubic meter ($\mu g/m^3$) as an airborne respirable eight-hour time-weighted average (TWA) concentration. NIOSH published the assessment in May 2021. More information is available in our May 20, 2021, blog item.
- Between September 2020 and May 2021, EPA received notification of one nanoscale substance that met reporting criteria pursuant to its authority under Section 8(a) of the Toxic Substances Control Act

The Tour de Table compiles information provided by delegations on developments concerning the safety of manufactured nanomaterials.

(TSCA), "bringing the total number of notifications to 78." Reporting criteria exempted nanoscale chemical substances already reported as new chemicals under TSCA and nanoscale chemical substances that do not have unique or novel properties. According to the *Tour de Table*, most reporting was for metals or metal oxides.

Read More

Nano and Other Emerging Chemical Technologies Blog, 26 January 2022

https://nanotech.lawbc.com/2022/01/oecd-tour-de-table-includes-update-on-nano-developments-in-the-united-states/

Registry of CLH intentions until outcome

2022-01-24

The Registry of CLH intentions until outcome was Last updated on 24 January 2022.

The registry of classification and labelling (CLH) intentions until outcome lists the intentions and proposals received by ECHA for a new or revised harmonised classification and labelling of a substance. The proposals are submitted by Member State competent authorities, manufacturers, importers or downstream users.

Interested parties can follow the progress of a proposal through the CLH process, from the notification of the intention to the adoption of the opinion of the Committee for Risk Assessment (RAC). The advance notice enables interested parties to plan and prepare for commenting later on.

Anyone with relevant information on the identity or hazard properties of a substance is encouraged to provide this information to the dossier submitter during the early stages of the process, or at the latest during the consultation.

Where an opinion has been adopted by RAC, the status is indicated as 'Opinion Adopted'.

Read More

ECHA, 24 January 2022

https://echa.europa.eu/nl/registry-of-clh-intentions-until-outcome

"I count on industry, civil society, academia, and public authorities to help us identify the solutions that can support these efforts."

Chemicals: Commission seeks views on revision of REACH, the EU's chemicals legislation

2021-01-20

Today, the Commission is launching a public consultation on the revision of the Regulation on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACHSearch for available translations of the preceding link•••). The revision will aim to align the EU chemical rules with the Commission's ambition for safe and sustainable chemicals and a high level of protection of health and the environment, while preserving the internal market. The planned REACH revision is one of the actions

announced in the Chemicals Strategy for SustainabilitySearch for available translations of the preceding link•••.

Commissioner for the Internal Market, Thierry **Breton,** said:

Europe already plays a leading role in safe and sustainable chemicals. Our chemicals policy aims to accelerate this transition for the benefit of our citizens and the environment, while continuing to enable innovation by the chemicals industry. I count on industry, civil society, academia, and public authorities to help us identify the solutions that can support these efforts.

Commissioner for the Environment, Oceans and Fisheries, Virginijus **Sinkevičius,** said

We have come a long way regulating chemicals in the EU. But the ambition of our European Green Deal is that we all live in a truly toxic-free environment. We cannot afford to expose our health and our nature to harmful chemicals. The revision of REACH will deliver on this ambition.

The Commission invites citizens and interested parties to express views on the following elements:

- revision of the registration requirements, including increasing information requirements and establishing the obligation to register polymers (the building blocks of plastics);
- introduction of mixtures assessment factors;
- simplification of communication in the supply chains;
- revision of the provisions for dossier and substance evaluation;
- reform of the authorisation and restriction processes, including the extension of generic approaches to risk management and the introduction of the essential use concept; and
- the revision of the provisions for control and enforcement.

The public consultation will provide insight for the ongoing work on an impact assessment. The consultation will run until mid-April 2022 and is available here. Today's publication is in English only. The translations in all the other languages of the EU will follow by mid-February.

Background

Chemicals are essential for the well-being, high living standards and comfort of modern society. They are used in many sectors, including health, energy, mobility and housing. However, most chemicals have hazardous properties which can harm the environment and human health.

REACH Update

FEB. 04, 2022

The EU already has sophisticated chemicals laws in place. REACHSearch for available translations of the preceding link••• has generated the most advanced knowledge base on chemicals in the world and set up scientific bodies to carry out the risk and hazard assessments of chemicals. The EU has also managed to reduce the risks to people and the environment for certain hazardous chemicals like carcinogens.

REACH aims to improve the protection of human health and the environment, to preserve the functioning of the internal market as well as to enhance innovation and competitiveness of the EU chemicals industry. This is done by the four processes of REACH, namely the registration, evaluation, authorisation and restriction of chemicals.

The European Commission published the Chemicals Strategy for SustainabilitySearch for available translations of the preceding link••• on 14 October 2020. It is part of the EU's zero pollution ambition, which is a key commitment of the European Green Deal. It aims to better protect citizens and the environment and boost innovation for safe and sustainable chemicals through its 85 planned actions.

Read More

European Commission, 20 January 2022

https://ec.europa.eu/environment/news/chemicals-commission-seeks-views-revision-reach-eus-chemicals-legislation-2022-01-20_en

Janet's Corner

FEB. 04, 2022

No Matter Watt

2022-02-04

defined.

https://www.pinterest.com.au/pin/356277020530238609/

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FEB. 04, 2022

Manganese

2022-02-04

Manganese is a chemical element, designated by the symbol Mn. It has the atomic number 25. It is not found as a free element in nature, it is often found in combination with iron, and in many minerals. [1]

Manganese is a pinkish-grey, chemically active element. It is a hard metal and is very brittle. It is hard to melt, but easily oxidised. Manganese is reactive when pure, and as a powder it will burn in oxygen, it reacts with water (it rusts like iron) and dissolves in dilute acids. [2]

USES [3]

Manganese is predominantly used to produce ferromanganese, or metallic manganese, which is used in the production of steel to improve hardness, stiffness, and strength. It is used in carbon steel, stainless steel, high-temperature steel, and tool steel, along with cast iron and superalloys. Manganese finds further applications in a number of non-ferrous alloys, especially with aluminium, magnesium, copper and zinc. The following are some of the applications of manganese compounds:

- Manganese dioxide is commonly used in the production of batteries, matches, fireworks, porcelain, glass-bonding materials and amethyst glass, as the starting material for production of other manganese compounds, and as an oxidising agent.
- Manganese chloride is used as a precursor for other manganese compounds, as a catalyst in the chlorination of organic compounds, as dietary supplement/food additive, in animal feed to supply essential trace minerals, in paint driers, fertilisers, in dyeing, disinfecting, purifying natural gas, and in dry-cell batteries.
- Manganese sulfate is used in glazes, varnishes, ceramics, dyeing, fertilisers, fungicides, and ore flotation. It is also used in medicines and as a nutritional supplement.
- Potassium permanganate is used as an oxidising agent, a disinfectant, as an anti-algal agent, in metal cleaning, in tanning, bleaching, and as a preservative for fresh flowers and fruits.
- Manganese gluconate is used as a feed additive, food additive, and dietary supplement.
- Manganese oxide is used in textile printing, ceramics, paints, coloured glass, animal feeds, fertilisers, and in welding. It is used as a catalyst

Manganese is a chemical element, designated by the symbol Mn.

in the manufacture of allyl alcohol, as food additive and a dietary supplement.

- Manganese nitrate is used as a colour agent in porcelain and ceramic manufacture, as a catalyst, and in the production of manganese dioxide.
- Manganese acetate is used in textile dyeing, fertilisers, food packaging, feed additives, and in manufacturing paints and varnishes.
- Manganese carbonate is used as a pigment, drier for varnishes, in medications, and as a plant nutrient. It is used in the manufacturing of manganese salts, pharmaceuticals, animal feeds, and ceramics.

SOURCES OF EMISSION & ROUTES OF EXPOSURE

Sources of Emission [3]

- Industry sources: Problems with air pollution can arise during the mining, crushing, and smelting of ores, during steel production, and from battery factories.
- Diffuse sources: Some agricultural and gardening applications may use products containing manganese. Some hazardous waste sites may leach manganese.
- Natural sources: Manganese is a naturally occurring element, although it is not naturally found in the metallic form. The earth's crust contains approximately 0.1 % manganese on average, with low levels present in lakes, streams, and the ocean. Nodules containing manganese oxides have been found on the seabed of the Pacific. More than 100 manganese minerals are known, including sulfides, oxides, carbonates, silicates, phosphates, and borates. The most important manganese mineral is native manganese dioxide (pyrolusite). Manganese ores very often occur together with iron ores.
- Transport sources: Mobile sources are normally not associated with emissions of manganese.
- Consumer products: Alkaline and dry cell batteries, some vitamin/ mineral dietary supplements, some fertilisers, some disinfectants, some porcelain and ceramic goods. Some drinking water supplies may contain small amounts of manganese.

Routes of Exposure [4,5]

- The main routes of exposure to manganese are inhalation, ingestion and contact with the skin and eyes.

- The primary way you can be exposed to manganese is by eating food or manganese-containing nutritional supplements. Vegetarians, who consume foods rich in manganese such as grains, beans and nuts, as well as heavy tea drinkers, may have a higher intake of manganese than the average person.
- Certain occupations like welding or working in a factory where steel is made may increase your chances of being exposed to high levels of manganese.
- Manganese is routinely contained in groundwater, drinking water, and soil at low levels. Drinking water containing manganese or swimming or bathing in water containing manganese may expose you to low levels of this chemical.

HEALTH EFFECTS [6]

Acute Effects

- No reports of effects in humans following acute (short-term) effects of exposure to manganese are available.
- Effects to the lung have been reported following acute exposure of rats to manganese via inhalation.
- Manganese is considered to have moderate acute toxicity based on short-term tests in rats. However, other animal tests in which manganese has been given orally have indicated that manganese has low acute oral toxicity.

Chronic Effects

- Chronic exposure to manganese at low levels is nutritionally essential in humans. The recommended daily intake of manganese is 2 to 5 mg/d for adults and adolescents.
- No cases of manganese deficiency have been observed in the general population. However, manganese deficiency in animals has been associated with impaired growth, skeletal abnormalities, impaired reproductive function in females, and testicular degeneration in males.
- Chronic inhalation exposure of humans to manganese results primarily in effects on the nervous system. Slower visual reaction time, poorer hand steadiness, and impaired eye-hand coordination were reported in several studies of workers occupationally exposed to manganese dust in air.
- Chronic inhalation exposure of humans to high levels may result in a syndrome called manganism and typically begins with feelings of

weakness and lethargy and progresses to other symptoms such as gait disturbances, clumsiness, tremors, speech disturbances, a mask-like facial expression, and psychological disturbances.

- Other chronic effects reported in humans from inhalation exposure to manganese are respiratory effects such as an increased incidence of cough, bronchitis, dyspnea during exercise, and an increased susceptibility to infectious lung disease.
- The Reference Concentration (RfC) for manganese is 0.00005 mg/m^3 based on impairment of neurobehavioral function in humans.
- EPA has established a Reference Dose (RfD) for manganese of 0.14 milligrams per kilogram body weight per day (mg/kg/d) based on CNS effects in humans.

Reproductive/Developmental Effects

- Reproductive effects, such as impotence and loss of libido, have been noted in male workers afflicted with manganism attributed to occupational exposure to high levels of manganese by inhalation. No information is available on developmental effects of manganese in humans.
- Animal studies have reported degenerative changes in the seminiferous tubules leading to sterility from intratracheal instillation of high doses of manganese (experimentally delivering the manganese directly to the trachea). In young animals exposed to manganese orally, decreased testosterone production and retarded growth of the testes were reported.
- Decreased activity levels and a decrease in average pup weight have been noted in the offspring of mice exposed to manganese by inhalation.

Cancer Risk

- Oral human and animal studies on manganese are inadequate. Several animal studies reported an increased incidence of thyroid gland follicular cell adenomas and hyperplasia, or increased incidence of pancreatic tumours.
- EPA has classified manganese as a Group D, not classifiable as to carcinogenicity in humans.

SAFETY [7]

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. Get medical attention if irritation occurs.
- Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.
- Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get 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

- Manganese in non-flammable.
- Moderate fire potential, in the form of dust or powder, when exposed to flame.
- If heated in the vapour of phosphorus at a very dull red heat, union occurs with incandescence.
- Concentrated nitric acid reacts with powdered manganese with incandescence and explosion.
- Powdered manganese ignites in chlorine.
- Moderate explosion potential, in the form of dust or powder, when exposed to flame.

Exposure Controls & Personal Protection

Engineering Controls

- Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits.
- If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protective Equipment

The following personal protective equipment is recommended when handling manganese:

- Safety glasses;

- Lab coat;
- Dust respirator (be sure to use an approved/certified respirator or equivalent);
- Gloves.

Personal Protective Equipment in Case of a Large Spill:

- Splash goggles;
- Full suit;
- Dust 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 [5,8]

OSHA: The Occupational Safety & Health Administration has set the following Permissible Exposure Limit (PEL)for manganese:

- General Industry: 29 CFR 1910.1000 Table Z-1 -- 5 mg/m^3 Ceiling
- Construction Industry: 29 CFR 1926.55 Appendix A -- 5 mg/m^3 Ceiling
- Maritime: 29 CFR 1915.1000 Table Z-Shipyards -- 5 mg/m^3 Ceiling

ACGIH: The American Conference of Governmental Industrial Hygienists has set a Threshold Limit Value (TLV) for manganese of 0.2 mg/m^3 TWA (TLV listed as Manganese and inorganic compounds, as Mn)

NIOSH: The National Institute for Occupational Safety and Health has set a Recommended Exposure Limit (REL) for manganese of 1 mg/m^3 TWA; 3 mg/m^3 STEL

EPA: The Environmental Protection Agency has determined that exposure to manganese in drinking water at concentrations of 1 mg/L for up to 10 days is not expected to cause any adverse effects in a child. It has also established that lifetime exposure to 0.3 mg/L manganese is not expected to cause any adverse effects.

FDA: The Food & Drug Administration has determined that the manganese concentration in bottled drinking water should not exceed 0.05 mg/L.

Australia [3]

Safe Work Australia: Safe Work Australia has set the exposure standard for manganese dust, fume, and compounds (as manganese) to 1 mg/m^3 (TWA). The recommended short-term exposure level (STEL) for manganese fume should not exceed 3 mg/m^3.

Australian Drinking Water Guidelines specify the following limits:

- Health: Maximum of 0.5 mg/L (i.e. 0.0005 g/L)
- Aesthetic: Maximum of 0.1 mg/L (i.e. 0.0001 g/L)

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World's deepest-dwelling squid spotted 20,000 feet under the sea

2022-01-19

A team of researchers hunting for the wreck of a lost WWII destroyer ship in the Philippine Sea returned to land with another, perhaps even more exciting discovery: Video evidence of the deepest-swimming squid ever recorded.

Cruising just above the floor of the Philippine Trench at a staggering 20,300 feet (6,200 meters) below the surface, the young bigfin squid (family Magnapinnidae) became an instant record holder — blowing the previous champ, another bigfin squid swimming about 15,400 feet (4,700 m) below the Pacific Ocean, out of the water.

The researchers also recorded four cirrate octopuses — better known as dumbo octopuses for their fins that resemble elephant ears — around the same depth, the team wrote in a recent study. According to study co-author Michael Vecchione, this is just the second time that dumbos have been observed so deep, proving that previous observations of the floppy-finned cephalopods in the Java Trench were not just a fluke.

"This dive showed that multiple types of cephalopods can live in at least the upper parts of these really deep ocean trenches," Vecchione, a zoologist with the National Oceanic and Atmospheric Administration (NOAA) who is Curator of Cephalopods at the Smithsonian Institution in Washington D.C., told Live Science in an email.

The sightings also raise some questions, Vecchione added — like, "How do bigfin squids manage to live physiologically at depths ranging from 3,200 to 19,600 feet (1000 to 6000 m)," where atmospheric pressures can be up to 600 times greater than at the ocean's surface.

Researchers detected the bigfin in March 2021, while hunting for the wreck site of the USS Johnston — a U.S. Navy destroyer that sank in 1944 during the Battle of Leyte Gulf. Using the manned submersible DSV Limiting Factor (the same type of submersible that explorer Victor Vescovo used to descend to the bottom of the Mariana Trench in June 2020), the researchers filmed their dive to the bottom of the Philippine Trench, where they explored for more than four hours.

The team spotted the bigfin squid just above the ocean floor. Although the sub was hovering too high to image the squid in precise detail, the researchers were able to discern telltale features — such as the squid's

Cruising just above the floor of the Philippine Trench at a staggering 20,300 feet (6,200 meters) below the surface, the young bigfin squid (family Magnapinnidae) became an instant record holder [.]

extremely large back fins and its distinct swimming posture — that confirmed its identity. Because the squid's tentacles were relatively short, the researchers hypothesized that the deep-dwelling cephalopod was a juvenile.

The team published their findings Dec. 2, 2021 in the journal Marine Biology.

Originally published on Live Science.

livescience.com, 19 January 2022

https://www.livescience.com

Study finds chemical pollution is now beyond safe boundary for the planet

2022-01-18

Chemical pollutants, including plastics, can impact the Earth in all kinds of ways. Manufacturing of these "novel entities" has grown so rapidly that governments are now unable to assess, let alone control the risks to Earth's ecosystems, new research has found, taking us beyond a safe "planetary boundary" and endangering the planet's stability.

Led by scientists at the Stockholm Research Centre, the study takes stock of the rate manufactured chemicals are entering the environment, and is claimed to be the first to asses the impact on the stability of the Earth system. There are around 350,000 of these "novel entities," on the global market, according to the researchers, including plastics, pesticides, industrial chemicals, chemicals in consumer products, pharmaceuticals and antibiotics, much of which make their way into the environment.

"There has been a 50-fold increase in the production of chemicals since 1950. This is projected to triple again by 2050," said co-author Patricia Villarubia-Gómez from the Stockholm Resilience Centre.

"There has been a 50-fold increase in the production of chemicals since 1950. This is projected to triple again by 2050," said co-author Patricia Villarubia-Gómez from the Stockholm Resilience Centre.

The scientists looked at this problem through the framework of what they called planetary boundaries, which represent the stable state Earth has existed in for 10,000 years. These boundaries include safe limits for greenhouse gas emissions, biodiversity, freshwater and other environmental factors that can impact the stability of the planet. The new study explores the boundary for novel entities and examines the many ways they can impact the planet's health, through mining, fracking, and waste management, for example.

"The pace that societies are producing and releasing new chemicals and other novel entities into the environment is not consistent with staying within a safe operating space for humanity," said Villarubia-Gómez.

Plastics are of particular concern, with the material containing more than 10,000 chemicals and therefore introducing all manner of new hazards to the environment. Studies have shown plastic to be present in the world's most remote environments, including the Arctic, Antarctic and high on Mt Everest. Further, they have shown how plastics can impact living marine organisms and even have toxic effects on human cells.

According to the team, plastic production increased by 79 percent between 2000 and 2015, and the total mass of plastics on Earth is more than twice the mass of all living mammals. Around 80 percent of plastics ever produced still persist in the environment, with production and subsequent pollution only expected to continue to increase.

The scientists say that together these trends on chemical production and pollution are endangering the Earth system, and steps should be taken to stem the flow.

"We need to be working towards implementing a fixed cap on chemical production and release," said Carney Almroth.

"And shifting to a circular economy is really important," added Sarah Cornell from the Stockholm Resilience Centre. "That means changing materials and products so they can be reused not wasted, designing chemicals and products for recycling, and much better screening of chemicals for their safety and sustainability along their whole impact pathway in the Earth system,"

The research was published in the journal Environmental Science and Technology.

Source: Stockholm Research Centre

newsatlas.com, 18 January 2022

https://www.nawsatlas.com

From the procurement of the pig's kidneys to the surgery itself, the study followed the exact same procedure that the team will use in a future clinical trial, Locke said.

Double pig kidney transplant successfully performed in brain-dead patient

2022-01-12

Scientists successfully transplanted two kidneys from a genetically modified pig into a human recipient and found that the organs produced urine and were not rejected during the days-long experiment.

The procedure was performed in a brain-dead patient who was a registered organ donor and whose family authorized the research, according to the new study, published Thursday (Jan. 20) in the American Journal of Transplantation. The research team intends to eventually transplant pig kidneys into living patients, in formal clinical trials — but first the team wanted to address some critical safety questions.

They tackled these questions in the organ recipient, monitoring him for any signs of transplant rejection, transmission of viruses from the pig donor or surgical complications that might be unique to the pig-to-human procedure. "This approach is founded on the premise that such questions must be answered before clinical trials of efficacy can be responsibly undertaken," the study authors wrote in their report.

PLAY SOUND

In September 2021, doctors performed a similar experiment with a brain-dead patient at NYU Langone Health, during which they attached one genetically modified pig kidney to the patient, Live Science previously reported. The kidney functioned normally throughout the 54-hour study period, filtering waste from the blood and producing urine without any immediate signs of transplant rejection, the NYU team told news outlets. But the kidney remained outside the recipient's body for the entire experiment, hooked up to blood vessels in the upper leg.

In the new study, the researchers transplanted not one, but two pig kidneys inside a recipient's body, where kidneys would be placed during a conventional human-to-human transplantation, Dr. Jayme Locke, lead surgeon for the study and the director of the Comprehensive Transplant Institute in the University of Alabama at Birmingham (UAB) Department of Surgery, told Live Science in an email. From the procurement of the pig's kidneys to the surgery itself, the study followed the exact same procedure that the team will use in a future clinical trial, Locke said.

The kidneys used in the study came from a genetically modified pig developed by Revivicor, a subsidiary of United Therapeutics. (Several

authors on the new paper are employees of Revivicor, and one is the company's chief scientific officer.) Earlier this month, doctors used a heart from another Revivicor pig to perform a first-of-its-kind heart transplant surgery, Live Science previously reported; the pig used for the heart transplant bore the same genetic modifications as the pig used in the new kidney transplant study, according to The New York Times.

Most of these genetic modifications are intended to reduce the risk of a transplant being rejected by the human body. For instance, the modified pigs lack three genes that each code for specific carbohydrates; in the human body, these carb molecules can set off an aggressive immune reaction. The donor pigs also lack a gene that codes for a specific growth hormone receptor, and without this receptor, the pigs' organs should stop growing once transplanted into a person.

Finally, the pigs carry six extra genes plucked from the human genome: four to help make each pig's organs appear more familiar to the human immune system and two to prevent the formation of blood clots.

After extracting the kidneys from their donor pig, the team inspected the organs. Overall, the pig kidneys closely resembled human kidneys, but differed in a few respects, the team noted.

For instance, the pig kidneys were softer to the touch; had a thinner capsule covering their outer surfaces; and the pig ureters — the ducts by which urine passes from the kidney to the bladder — were larger in diameter than typical human ureters. At this point, it's unclear whether these slight differences might affect the kidneys' function in a human, but "these observations underscored the need for meticulous handling and surgical technique," the study authors noted in their report.

The team prepared the human recipient for the transplant procedure by removing both his kidneys and providing immunosuppressive drugs, to reduce the risk of organ rejection. Then, after placing both pig kidneys into the recipient, the team monitored the organs for about three days.

In that time, the body didn't mount an immune response against the kidney, they observed. When a phenomenon called "hyperacute rejection" occurs, the body starts attacking a transplant organ soon after it is hooked up to the human circulatory system, once antibodies in the blood reach the organ. The donor pig had tested negative for porcine endogenous retroviruses — viruses that can hide in pig DNA and can infect human cells — and the team confirmed that there were also no signs of these viruses following the transplantation.

After transplantation, the right kidney initially showed "robust" urine production, while the left kidney produced much less urine, by comparison. The reason for this difference is unknown, but may be related to how each organ was initially procured from the donor pig, the authors noted. Compared to the right kidney, the left kidney spent more time at room temperature after being cut off from the pig's blood supply and before being placed on ice. More research is needed to know how such factors might impair the function of a pig organ in a human recipient, the authors wrote.

Although both kidneys produced urine, albeit in different quantities, neither organ filtered waste from the blood as a fully-functioning kidney would. The team found that the level of creatinine, a waste product of muscle cell function, in the blood did not decrease over time, and neither kidney excreted significant creatinine into the urine. It's unclear whether this dysfunction stemmed from damage to the kidneys, or was related to the physiological changes caused by brain death, the researchers noted.

"The brain death environment is quite hostile, making assessment of kidney function difficult," Locke said. Over the course of the experiment, the patient's organs began to fail, he developed abnormal blood clotting, and his blood also became more acidic due to a build-up of hydrogen ions. The researchers used various medications and infusions to counter these effects of brain death during the study, but even so, the effects might have undermined the pig kidneys' function, the authors wrote.

"This was not a surprising observation to us given that, even in human-to-human transplantation, kidneys from brain-dead donors often have delayed graft function, meaning that they often do not make urine for a week and take several more weeks to clear creatinine," Locke told Live Science.

Overall, the study suggests that, while many barriers to pig-to-human kidney transplants have been surmounted, many questions about the procedure remain unanswered, the authors wrote. Future studies in brain-dead individuals could provide some of the answers to these questions, while others may need to be investigated in non-human primates. And eventually, some questions will be addressed in clinical trials in living humans.

Locke and her colleagues are now going through the process of submitting a Investigational New Drug Application to the U.S. Food and Drug Administration; once authorized, this will allow the team to use the genetically modified pig kidneys in a clinical trial. They will also need to

obtain approval for such a trial through UAB's institutional review board. "Both of these efforts are well under way," Locke said.

livescience.com, 12 January 2022

https://www.livescience.com

Doctor reveals stinky farts can make you go blind

2022-01-19

There's a reason they're called silent but deadly - according to one doctor, really stinky farts can theoretically make you go blind. You can watch the video here:

OK, so obviously this only happens in very extreme cases - but nonetheless, it might make you think twice before letting one rip.

Dr Anthony Youn, a holistic plastic surgeon from Michigan, America, was responding to a comment by someone who claimed to have gone blind for three minutes after farting.

Turns out, there could be a reason for the commenter's alleged sight loss, and the medical professional was on hand to explain the science behind the phenomenon.

In the video, he says: "Although this is very unlikely, if the gas you pass is extremely pungent, it could contain large amounts of hydrogen sulfide.

"Studies show that hydrogen sulfide is very effective at reducing blood pressure.

"If [a fart] reduces blood pressure to the central retinal artery, your silent but deadly toot could theoretically make you go blind.

"So be careful if you're making a lot of bubbles in your bathtub!"

The clip has garnered 3.1 million views on TikTok, and while some people were shocked at the revelation, others weren't all that surprised.

One commenter: "I've been around others who passed gas and I almost threw up, definitely got dizzy... so I can see going blind from someone else as a possibility."

Another joked: "Taco Bell is going to have a lawsuit on their hands," while a third added: "OMG my husband's going blind!"

"So be careful if you're making a lot of bubbles in your bathtub!"

While we're on the weird and wonderful topic of farting, it's not just stinky ones that cause some damage.

A former reality star who made $200,000 (£148,000) from farting in jars has announced her retirement, after she was rushed to hospital for squeezing out one too many.

Steph Matto, 31, from Connecticut, recently found herself in A&E with symptoms of a 'heart attack' after experiencing shooting pains in her chest.

Concerned doctors performed blood tests and an electrocardiogram (EKG/ECG) but later told the 90 Day Fiancé star that the symptoms were actually caused by excess gas from her frequent diet of beans, eggs and banana protein shakes.

Speaking about her hospital visit, she said: "I didn't tell my doctors about the farting in the jar but I did tell them about my diet.

"It was made clear that what I was experiencing wasn't a stroke or heart attack but very intense gas pains.

"I was advised to change my diet and to take a gas suppressant medication, which has effectively ended my business."

ladbible.com, 19 January 2022

https://www.ladbible.com

How a toxic chemical ended up in the drinking water supply for 13 million people

2021-01-23

TRENTON, N.J. — New Jersey's largest drinking water supplier discovered a toxic chemical in the river where it gets water for hundreds of thousands of customers, setting off a major search for polluters that led back to a Pennsylvania wastewater treatment plant and a South Jersey company.

The chemical New Jersey American Water Co. found, 1,4-Dioxane, is a byproduct of plastic manufacturing that is considered a likely carcinogen by the federal government. While the chemical has been found in water supplies before, this discovery in early 2020 set off alarms because of the high levels in a section of the Delaware River close to American Water's treatment plant in South Jersey that sends drinking water to customers in Burlington, Camden, Gloucester and Salem counties.

The chemical New Jersey American Water Co. found, 1,4-Dioxane, is a byproduct of plastic manufacturing that is considered a likely carcinogen by the federal government.

Gossip

FEB. 04, 2022

It wasn't just a New Jersey problem. The Delaware and all of its tributaries provide drinking water to more than 13 million people along the East Coast — including New Jersey, New York, Pennsylvania and Delaware — and officials had no idea how the chemical was getting into the river.

What they found, the details of which have not been previously reported, is a gap in state and federal regulations that allowed an unsafe chemical to end up in an essential water supply.

There are no federal limits for how much 1,4-Dioxane can be in drinking water, though New Jersey is proposing new rules that would limit the chemical to .33 parts per billion. Some samples from 2020 found nearly 10 times that amountin the Delaware. New Jersey officials have said they believe those levels ultimately did not "pose any immediate health risk," by the time drinking water reached customers.

Officials from across the region, including the Delaware River Basin Commission, the multi-state agency tasked with looking after the river, set up a group to track down the source of the contamination.

Though their work continues, it comes with an unsatisfying twist: Someone clearly sent the chemical into the river, but it's not clear whether anyone will face consequences for polluting one of the country's major water supplies.

Some chemicals, including 1,4-Dioxane, remain largely unregulated. And even as New Jersey's Department of Environmental Protection is preparing for the first time to set strict limits on the amount of 1,4-Dioxane allowed in drinking water, it seems unlikely those rules would have prevented the Delaware River contamination.

New Jersey's planned rules require drinking water suppliers to look for and remove most of the chemical from drinking water — but the rules don't do more to keep polluters from putting it there in the first place.

The Delaware River incident highlights the extent to which drinking water suppliers are often on the hook for cleaning up other people's problems, even as New Jersey American is expanding its treatment process to handle 1,4-Dioxane and other contaminants, like other "forever chemicals" the public only recently understood are unsafe.

A big part of figuring out where the pollution was coming from fell to Matt Csik, the top water quality official for New Jersey American Water. He needed to know how a likely carcinogen was getting into the river and

threatening his customers' water. In a watershed that stretches from the Catskill Mountains to Rehoboth Beach, Del., that was a challenge.

So, in October 2020, Csik put on his wetsuit and started taking water samples from the Delaware.

His sampling suggested the chemical was in water coming from one of the Delaware's main tributaries, the Lehigh River, which cuts through Pennsylvania before dumping into the Delaware.

"It was pretty clear to me at that point that we had at least the smoke to tell us where the fire could be," Csik said in an interview.

Csik's work helped narrow down where the larger regional search party would look and ultimately find the chemical — near a wastewater treatment plant in Allentown, Pa., operated by the Lehigh County Authority. A sample taken from the Lehigh River near the treatment plant found levels of 1,4-Dioxane more than 100 times higher than what New Jersey's proposed rules would say is safe to drink.

The Allentown plant takes wastewater, cleans it up, then discharges it into the Lehigh at a point right before where the Lehigh empties into the Delaware. The plant handles chemicals on a federal priority list, but 1,4-Dioxane isn't one of them, and the plant hadn't studied how to treat it. That makes 1,4-Dioxane one of thousands of potentially harmful chemicals that are not an official priority for federal regulators, even though they have already determined long term exposure to it may cause kidney and liver damage.

"We weren't looking for it and didn't know to look for it," Liesel Gross, the CEO of the Lehigh County Authority said in an interview.

But now the plant needed to find out who was sending it wastewater laced with 1,4-Dioxane.

Most people know wastewater treatment plants handle what comes to them through sewage systems. But some plants, including the one in Allentown, have lucrative side businesses accepting waste from outside haulers.

The Lehigh County Authority, a public agency run by local officials, received about $2.9 million in 2020 treating all kinds of hauled waste, including $38,000 from Coim USA, Gross said in an email. Coim which had been sending some wastewater to the Allentown plant Pennsylvania since 2018 from its polymer manufacturing facility in West Deptford, N.J.

Coim is an Italian polymer and plastics maker, and 1,4-Dioxane is one of its byproducts.

According to regulatory filings Coim submitted to the federal Environmental Protection Agency, the company should have been sending waste containing 1,4-Dioxane to an incinerator near Niagara Falls, N.Y.

But when the Allentown treatment plant conducted tests in June 2021 to find who was bringing 1,4-Dioxane to its facility, it found Coim was the "main contributor."

The treatment plant immediately stopped accepting Coim's waste and the amount of 1,4-Dioxane in the Delaware dropped, according to officials from New Jersey American Water and the Pennsylvania Department of Environmental Protection, both of which have the results from subsequent water samples in the Lehigh and Delaware rivers.

Coim USA's president, Michelangelo Cavallo, denied responsibility for polluting the river and said the June test that found 1,4-Dioxane in the wastewater it was sending to Pennsylvania was the result of an accident. That time — and that time only, Cavallo said — the company mixed up the tank it was sending to the Allentown plant with the one meant for the incinerator in Niagara Falls.

"It was a simple mistake," Cavallo said in an interview. "Never happened in the past and … it will not happen in the future."

Regulators haven't taken any formal action against anyone involved in the incident.

The EPA requires plants like the one in Pennsylvania to test for about 130 different chemicals, out of what experts say are thousands of industrial chemicals that can end up in wastewater. After a plant tests for what they have to, they have little insight into what else might be is going into their facilities — or what might be is coming out.

"In this case, if there are not regulations that prevent a thing from occurring, the thing can occur," said Shawn LaTourette, New Jersey's top environmental regulator. "I think the public has a really hard time with this, and understandably so."

Tracy Carluccio, deputy director of the nonprofit Delaware Riverkeeper Network, said failing to test for pollutants is long-standing problem along the river.

"But ignorance is not bliss, and this is no excuse for pollution," she said.

Work is continuing to track down other sources of 1,4-Dioxane in different parts of the Delaware, though New Jersey American's sampling shows the primary source of the chemical threatening its supplies has substantially gone away since last summer.

Csik, New Jersey American's water quality official, said the utility was fortunate to have a treatment process that helped remove 1,4-Dioxane and is getting ready to add another treatment process that further removes the chemical.

This is not the first time 1,4-Dioxane has threatened New Jersey drinking water. Several years ago, the federal government asked large water suppliers throughout the country to test for the chemical. About a tenth found some level of 1,4-Dioxane, but nearly a quarter of New Jersey suppliers found it, including about 30 drinking water systems that had levels of the chemical at or above what would be allowed under the state's newly-proposed proposed rules.

Tom Neltner, the chemicals policy director of the Environmental Defense Fund, a nonprofit group, said incidents like the one in the Delaware are pretty common, though the details are rarely reported. Tracking down the unusual toxic trail can be difficult and municipal wastewater treatment plants, like the one in Allentown, may not know what industrial polluters are sending them.

He said the Safe Drinking Water Act, the key law that protects Americans' drinking water, may be ill-suited for a world where potent and robust chemicals, like the 1,4-Dioxane found in the Delaware River, can come from far away and be dangerous in tiny amounts.

"In many ways, we use the Safe Drinking Water Act as a cleanup program, to clean up the water that never should have been contaminated in the first place," Neltner said in an interview, "instead of trying to prevent it from being contaminated in the first place."

politico.com, 23 January 2022

https://www.politico.com

"But some species within those groups may be less affected than other species, depending on how heavily they rely on odour cues."

Air pollution reduces ability for butterflies and bees to pollinate flowers and crops, study finds

2022-01-20

A study looking at the impacts of common air pollutants has found that flower pollination is significantly lower where pollution is present.

Key points:

- Visits to flowers by pollinators was more than 80 per cent lower where pollutants were present
- Researchers think the pollution interferes with the insects' ability to sniff out flowers
- There could be significant impacts on crops and ecosystems where pollution is high

In a controlled field trial, the abundance of bees, flies, moths and butterflies and how often they visited flowers was far lower in the presence of nitrogen oxides (NOx) and ozone (03), compared to plots where those pollutants were absent.

Nitrogen oxides mostly come from agricultural emissions but are also produced when fossil fuels are burnt. Combined with sunlight and volatile organic compounds, they can form ground-level ozone (O3).

According to the researchers, whose paper was published today in the journal Environmental Pollution, the pollinators that appeared to be most affected were those species that rely on smell to detect flowers.

And it appears that vital pollinators are impacted the most.

"We found that those groups of pollinators that are most important [like] solitary bees, bumblebees, honey bees, were most affected in general," Dr James Ryalls and Dr Robbie Girling from the University of Reading told the ABC.

"But some species within those groups may be less affected than other species, depending on how heavily they rely on odour cues."

The presence of air pollution, even at levels lower than US national guidelines, appeared to be interfering with the insects' ability to sniff out flowers and could reduce rates of pollination in areas where air pollution is high, they said.

"The decreases in flower visitation due to air pollution were almost certainly associated with the disruption of floral odour cues."

"Air pollution levels often exceed these guidelines in agricultural settings, especially if they are near major roadways.

"If this problem is demonstrated more widely and grows in severity, it is certainly likely to have negative consequences for the yields of many insect-pollinated crops."

Impact on insects worse than expected

While the researchers said they anticipated their field trial to concur with previous laboratory studies, they weren't expecting such strong results.

"We were surprised by how severe the decline in pollinator abundance and flower visitation was under air pollution.

"Especially considering the relatively moderate levels of air pollution that were used."

To get their findings, the scientists used generators to pump low levels of ozone, nitrogen oxide, and a combination of the two into plots in a field. They also had "control" plots without any pollutants pumped in.

The plots were filled with black mustard plants (Brassica nigra) and observers tallied the number and species of insect visitations to flowers across each plot.

The yield of developed and undeveloped flowers was also calculated at the end of the trial, and efforts were made to control for variables, including rotating the plots and measuring insect abundance in the absence of flowers.

Beetles, some bugs and wasps not affected

The presence of air pollution reduced the overall abundance of seven pollinator groups, but not for three groups — beetles, true bugs and parasitic wasps.

But even with the continued abundance of those three groups, overall pollinator numbers were reduced by 62 per cent and flower visitation by 83 per cent where pollutants were present.

Ken Walker, senior curator of entomology at the Museum of Victoria, says some insects are what's known as oligolectic — they rely on a single species for food.

Interfering with their capacity to find pollen could be very damaging to both the insect and the plants they pollinate, he said.

"The nose of insects is on their antennae," Dr Walker said.

"Anything that disrupts these chemoreceptors on the insects' noses will certainly make it harder to find food."

Are insect populations declining globally?

Dr Walker says there's quite a bit of evidence to suggest there's been a global decline in insects, but more research is needed.

"I hesitate to say it's been globally assured that it's happening. It probably is, but we just don't have the data," he said.

"There have been several studies — none in Australia — but there was a study done by amateurs collecting insects in nature reserves in Germany near agricultural areas.

"They found something like a 76 per cent reduction in insect biomass over 25 years."

While pesticides and the conversion of wilderness to agricultural land have been implicated in the decline, Dr Walker says we're now becoming more aware of the impact of pollutants, including light pollution.

"There's been a lot of work done on polluters for human health, but very little has been done on insect health," he said.

"[But] we're now beginning to realise the effects on insects and pollinator health might be quite significant as well."

It's estimated that roughly one in three spoonfuls of food we eat has involved pollination in its production, Dr Walker said.

abc.net.au, 20 January 2022

https://www.abc.net.au

The chemicals are linked to pregnancy complications, liver disease, cancer and other illnesses.

Toxic 'forever chemicals' found in British otters

2022-01-25

Toxic "forever chemicals" used in non-stick saucepans and food packaging have been found in otters across England and Wales, according to a study.

The substances, called PFASs, are also used in waterproof clothing, stain resistant products and fire retardants.

The chemicals are linked to pregnancy complications, liver disease, cancer and other illnesses.

Scientists say concentrations of these compounds in otters are a guide to levels of pollution in the environment.

The substances can leach out from products, getting into drains and sewage treatment works - from which they can then escape and contaminate the environment more widely.

PFAS substances are present in farmland sludge, which can wash from fields into rivers. Factories and landfill sites are another source for the chemicals.

Denmark recently banned their use in food packaging paper.

Used since the late 1940s, PFAS chemicals - which are divided into compounds called perfluoroalkyls and polyfluoroalkyls - help to make products water, grease and stain resistant.

They are known as "forever chemicals" because they don't break down easily in the environment. They contaminate fish, which can then be ingested by animals and humans. PFAS compounds can also get directly into drinking water.

Researchers tested 50 otters found dead in 2007-09 and detected PFASs in all of them. 80% of the animals had at least 12 different types of the chemicals in their livers. Despite subsequent voluntary restrictions by the industry, a similar range of PFASs were found in a more recent sample of otters that died in 2014 - 2019.

Emily O'Rourke, a PhD student at Cardiff University and lead author of the study, told BBC News that otters were a "sentinel" species, revealing "widespread environmental pollution" of British fresh waters. The research backs up a recent Environmental Audit Committee report which showed there was a "chemical cocktail" of pollutants in rivers.

It's unclear whether the concentrations of chemicals found in the otters are high enough to cause harm. The otters mainly died in road collisions and so the precise impact of the chemicals on their health is not known. Ms O'Rourke said it was likely the toxic chemicals had a "sub-lethal" effect.

Britain should 'catch up'

PFASs will be in the environment "for years and years to come" according to Ms O'Rourke.

"When we are washing clothes, or just washing things down the drain, they get into our sewage works, which are not designed to remove PFASs because they're ancient. They are also retained in the sewage sludge," she said.

Ms O'Rourke said there were over 5,000 different types of the chemicals now in use. So far they had been regulated individually, but she believes they should be regulated by class.

"Denmark recently banned their use in food-contact paper - like in fast-food packaging - and Britain needs to catch up. Now that we are not under the EU chemicals framework, we need to get our own chemicals strategy," Ms O'Rourke explained.

Some 27 NGOs including Breast Cancer UK, The Alliance for Cancer Prevention and the CHEM Trust have come together to set out the case for a UK Chemicals Strategy, which should include phasing out "all very persistent chemicals, including the whole PFAS family and other halogenated chemicals".

Since 2000, a series of voluntary industry initiatives has limited their use. However, according to the study, concentrations of PFASs are regularly recorded that are above the Environmental Quality Standards for water and fish in England.

In July 2021, Germany, Denmark, the Netherlands, Norway, and Sweden officially informed the European Chemicals Agency (ECHA) of their intention to restrict PFAS.

Dr Elizabeth Chadwick, principal investigator on a long-term monitoring scheme called the Otter Project, encouraged members of the public to continue reporting otters found dead.

"Our research was possible though the ongoing collection of otters found dead from across Britain. Our archive has samples from more 4,000 individuals collected since 1992; it is a unique and important resource for understanding this protected species, and for understanding environmental contamination and health," she said.

The findings have been published in the peer-reviewed journal Environmental Science & Technology.

bbc.com, 25 January 2022

https://www.bbc.com

Antarctica's doomed A68 iceberg dumped 1 trillion tons of water into the ocean over 3 years

2022-01-23

After the world's largest iceberg snapped off of the Antarctic Peninsula in July 2017, it drifted north on a three-year death march, shedding an unfathomable amount of meltwater into the sea. Now, a new study of the doomed iceberg (named A68a) reveals just how much water the infamous mega-berg actually lost — and how that could impact the local ecosystem for generations to come.

Using observations from five satellites, the study authors calculated how much the iceberg's area and thickness changed as it drifted north through Antarctica's Weddell Sea and into the relatively warm waters of the Scotia Sea. There, while the berg appeared to be headed for a direct collision with South Georgia island, iceberg A68a lost more than 152 billion tons (138 billion metric tons) of fresh water in just three months — a mass equal to an incomprehensible volume of water that could fill more than 60 million Olympic-sized swimming pools, according to the study authors.

"This is a huge amount of meltwater, and the next thing we want to learn is whether it had a positive or negative impact on the ecosystem around South Georgia," lead study author Anne Braakmann-Folgmann, a researcher at the Centre for Polar Observation and Modelling in the U.K., said in a statement. "Because A68a took a common route across the Drake Passage, we hope to learn more about icebergs taking a similar trajectory, and how they influence the polar oceans."

When iceberg A68a broke off of the Larsen-C ice shelf in northern Antarctica in July 2017, it measured about 2,300 square miles (6,000 square kilometers) in area — roughly large enough to hold the five boroughs of New York City five times over. The berg ranked as the sixth largest iceberg ever observed on Earth and the single largest iceberg floating through the ocean during its 3.5-year life span.

A68a bumped through the chilly Weddell Sea for about two years, moving north at a (pardon the expression) glacial pace. During this time, the iceberg barely melted and lost little volume, the researchers said.

Only when A68a drifted north into the Scotia Sea did the real mass-loss begin. There, the iceberg's melt rate increased by nearly eightfold, as the comparatively warm waters lapped away at the iceberg's base and edges. For three months between November 2020 and January 2021, the iceberg

"Because A68a took a common route across the Drake Passage, we hope to learn more about icebergs taking a similar trajectory, and how they influence the polar oceans."

reached its peak melt rate, losing more than 150 billion tons (136 metric tons) of ice in that period.

Scientists feared that the still-massive iceberg would smash head-on into South Georgia island, a British overseas territory that's home to large penguin and seal populations. Unlucky animals could have been crushed to death in the collision, while countless others could have lost access to their regular feeding and foraging routes, Live Science previously reported.

Fortunately, A68a never made landfall near the island — but, the new study shows, it came perilously close. According to the team's research, the iceberg collided briefly with the seafloor near South Georgia — however, A68a had thinned so much by that point that it didn't get stuck. By late December 2020, the iceberg began cracking into pieces, further reducing the risk to South Georgia's animal populace.

By April 2021, iceberg A68a had completely melted away. In total, the icy object lost about 1 trillion tons (900 million metric tons) of ice in just over three years.

Even with the iceberg having vanished into the sea, the impacts on South Georgia island and the surrounding sea life may not be over, according to the study authors. As A68a dumped fresh water into the salty sea around the island, it also dumped nutrients that could boost biological production, possibly altering the types of plankton that thrive there. This boost could have widespread impacts up the local food chain, the researchers said — though whether that will be a positive or negative in the long-term is yet to be seen.

The study was accepted for publication in the March 1 issue of the journal Remote Sensing of Environment.

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livescience.com, 23 January 2022

https://www.livescience.com

The area remains relatively free from development and other threats associated with human presence.

Climate change might be shrinking Amazonian birds

2022-01-28

After spending weeks at a time deep in the Amazon rainforest, ecologist Vitek Jirinec and his colleagues began to suspect that something was wrong with local bird populations. This suspicion arose from decades-long data collection that has provided researchers with useful insights on the

specific suite of birds in a remote spot north of Manaus, Brazil. The area remains relatively free from development and other threats associated with human presence.

Jirinec slept in a hammock under a metal-roofed shack at his research station, and some days he and his team watched thousands of army ants sweep through mist netting. The station features a setup that resembles volleyball nets in order to capture birds, though the mesh is fine enough to avoid injuring them.

The scientists knew rare species like the wing-banded antbird were disappearing from more fragmented forest areas, but as the years went on they observed fewer and fewer of these animals — even in this relatively pristine section of contiguous forest.

"Some species are now much less common than they were back in the day," says Jirinec, who is affiliated with the Integral Ecology Research Center, a nonprofit research organization based in California. Analysis confirmed these suspicions, and follow-up work also showed that many birds were experiencing physical changes that could affect population trends — they were shrinking.

Missing Birds

In a 2020 Ecology Letters study, the researchers reported that rarer birds are indeed decreasing in numbers. This disappearance has transpired more slowly among such species in the contiguous forest rather than those found in fragmented forest areas.

Birds that specialize in eating insects on or near the forest floor seem to exhibit the most dramatic reductions, Jirinec and his colleagues noted, a possible result of reduced food availability — other species with less considerable declines could be outcompeting these birds.

They couldn't precisely determine why species might be declining, though they suspected climate change might play a role by shifting the conditions in habitats that ground and near-ground birds are typically adapted to.

To better understand these possible shifts, the researchers began to look at non-lethal impacts that could still impact survey data. "When someone is not doing well, they tend to lose weight — the same thing could be happening with birds," Jirinec says.

A Shrinking Data Set

In a Science Advances study published last fall, the researchers analyzed survey data that was recorded between 1979 and 2019 from 77 bird species to see if they could find any trends both in rarer birds, such as the wing-banded antbird, and in more common species like the white-throated manakin.

They encountered a concerning pattern: Nearly all the examined species had decreased in mass. Over the 40-year period, birds' measures dropped by 3.8 percent on average. The species with the worst impacts decreased by roughly twice that, including the riverbank warbler, dusky-throated Antshrike, and the white-necked thrush. Each decade, the hardest-hit birds are measuring about 2 percent lighter than their 1980 mass, Jirinec says.

Warming Amazon

Over the course of the data collection, the region's average temperatures rose significantly. The wet season temperature increased by about 1 degree Celsius (1.8 degrees Fahrenheit) while the dry season temperature increased by about 1.65 degrees Celsius (2.97 degrees Fahrenheit). Since 1966, the wet season has also gotten 13 percent wetter, while the dry season has grown 15 percent dryer.

While scientists aren't completely sure why these birds' masses are shrinking, the phenomenon could be explained by Bergmann's Rule, a theory that correlates the average body size of warm-blooded mammals with regional temperature. The principle explains why larger animals are often found in higher latitudes, while those near the equator are often smaller. Bigger creatures need mass to conserve heat, while smaller animals are better at losing heat and therefore more successful in hot climates. So these birds could be ditching mass in response to elevated temperatures.

Meanwhile, many species' wing lengths seem to have increased. Climate change might also explain this transformation: Scientists speculate that longer wings translate to less exertion and water loss, which could be important in hotter climates. Species located higher in the tree canopy, where it tends to be hotter, also saw the most change in shape, on average. "The birds that are exposed to the highest temperatures are changing the most," Jirinec says.

These Amazon findings align with 40-year data from Chicago on more than 70,000 birds from 52 species who died after striking buildings. Researchers from the Field Museum and the University of Michigan showed that the body size of all of these birds shrank on average, while

many individuals' wing length increased. They also thought climate change could have played a role.

But Amazon-specific research is particularly important because it offers a rare look at the possible effects of temperature shifts in rich ecosystems. "We don't have a lot of windows into what's going on in the Amazon," Jirinec says.

discoverymagazine.com, 28 January 2022

https://www.discoverymagazine.com

Evidence of PFAS chemicals in sports bras

2022-02-02

Fifteen out of 23 popular sports bras have detectable levels of fluorine, an indicator of toxic PFAS, according to a new report from Mamavation.

Partnering with EHN.org, the environmental wellness blog and community Mamavation tested the sports bras and found levels of fluorine ranging from 10 parts per million (ppm) up to 58 ppm. EHN.org partially funded the testing and Pete Myers, chief scientist of Environmental Health Sciences, which publishes Environmental Health News, reviewed the findings.

Sports bras made from synthetic materials, rather than cotton, were more likely to have detectable levels of fluorine.

Sports bras made from synthetic materials, rather than cotton, were more likely to have detectable levels of fluorine

While the testing doesn't prove per-and polyfluoroalkyl substances (PFAS) are in the bras, fluorine is a strong indicator of the "forever chemicals"—which have been linked to everything from cancer to birth defects to lower vaccine effectiveness.

Nursing mothers and PFAS

The testing—which mostly found fluorine specifically in the nipple-adjacent fabric—was conducted by an EPA-certified lab and flagged any clothing that had more than 10 parts per million (ppm) fluorine. It is unclear what exposure to PFAS through clothing means for humans; however, previous lab research by the National Institute for Occupational Safety and Health found that PFAS skin exposure poses similar health risks as ingesting the chemicals via food or water.

And toxics near the nipple raise concerns for mothers who are breast feeding.

"Nursing mothers may want to consider showering after sweating inside a sports bra before they nurse," Dr. Linda Birnbaum, Scientist Emeritus and former Director of the National Institute of Environmental Health Sciences and National Toxicology Program, told Mamavation. "But because PFAS does not break down, at every turn, the environment will be exposed– starting at the factory and ending inside a landfill where it never breaks down."

While the testing is concerning, the good news is there were eight brands with low or no fluorine. Three that tested clean and are made mostly organic include Go Pact Organic Racerback Lounge Bra, Rawganique BEVERLY Organic Cotton Triple Strap Active Bra, and Satva GOTS Organic Nanda Bra.

The sports bra testing is part of an ongoing effort by Mamavation and EHN.org to identify PFAS in common consumer products, and comes on the heels of testing that found PFAS in workout and yoga pants.

See the full results at Mamavation.

Banner photo: Subtle Cinematics/Unsplash

ehn.org, 2 February 2022

https://www.ehn.org

Why does slicing onions make you cry?

2022-01-19

Whether sautéed, grilled, caramelized or raw, onions are a staple in many U.S. households; the average American consumes 20 pounds (9 kilograms) of onions per year. But their coveted flavor comes at a price: Whoever chops them may soon feel tears running from their burning eyes. But why does slicing onions make you cry?

The culprit is called the lachrymatory factor, a chemical that irritates the eyes. When the onion is intact, a group of compounds called cysteine sulfoxides are kept separate from an enzyme called alliinase. But when you slice, dice or crush the onion, the barrier separating the compounds and enzyme is broken. The two come together, setting off a reaction: The alliinase causes the cysteine sulfoxides to become sulfenic acid.

"Sulfenic acids are not very stable," so they must change into something else, said Josie Silvaroli, a doctor of pharmacy doctoral candidate at The Ohio State University and first author of a 2017 study in the American Chemical Society's journal ACS Chemical Biology about the lachrymatory factor. In an onion, the sulfenic acid has two options. Option one is that it can spontaneously condense, a reaction within itself, and become an organosulfur compound. Organosulfur compounds are what give onions their strong smell and flavor. A similar reaction happens in garlic, which is why it also has such a pungent flavor, Silvaroli said.

PLAY SOUND

But option two for the sulfenic acid is unique to onions and a couple other alliums, or a genus of flowering plants that produce vegetables such as onions, garlic, scallions and shallots. Another enzyme, called lachrymatory factor synthase, that's been hiding out in the cell comes into play and rearranges sulfenic acid into the lachrymatory factor.

The lachrymatory factor is a volatile liquid, meaning it turns to vapor very quickly, Silvaroli said. That's how it reaches your eyes and irritates sensory nerves. "Your eyes start tearing up to get rid of the irritant," Silvaroli told Live Science.

It's likely that both the organosulfur compounds that give onions their intense flavor and the tear-inducing lachrymatory factor evolved as defense mechanisms, Silvaroli said. They are meant to stop insects, animals or parasites that might damage the onion plant.

But their coveted flavor comes at a price: Whoever chops them may soon feel tears running from their burning eyes.

If burning tears are more than you can bear, you do have options. Bon Appetit recommends you wear goggles or a face shield to protect your eyes. (Contact lenses also offer a barrier against lachrymatory factor.) Using a sharp knife, which damages fewer cells and creates less "tear gas" than a dull knife, may also help.

There are also efforts to create tear-free (or at least fewer-tear) onions. The Sunion, whose cultivators describe it as "sweet and mild," was developed using crossbreeding techniques to be less pungent. But Silvaroli is wary; because the compounds responsible for lachrymatory factor are the same flavorful organosulfur compounds that give onions their distinct taste, reducing the cry factor could also dull the onion's flavor. For now, Silvaroli said, "If you want that flavor, you might need to suffer through some burning."

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Tonga volcano: Why was it so big, and are there others we need to watch out for?

2022-01-18

When the Hunga Tonga Hunga Ha'apai volcano erupted in Tonga on Saturday, it sent a huge plume 30 kilometres into the sky and a literal shockwave around the world.

Every week there are around 20 volcanoes "showing some signs of unrest" across the globe, but most are fairly mild, says Scott Bryan, a volcano researcher at the Queensland University of Technology.

So what made this volcano so explosive, was the eruption predicted, will it erupt again soon, and are there other volcanoes we should be watching out for?

Why was it so explosive?

The Hunga Tonga-Hunga Ha'apai volcano is what is known as a subduction volcano.

Subduction zone volcanoes occur along tectonic plate boundaries where one plate is being forced down under another.

The Hunga Tonga-Hunga Ha'apai volcano is what is known as a subduction volcano.

Curiosities

FEB. 04, 2022

Subduction volcanoes tend to have dual personalities, according to Professor Bryan.

On the one hand, they have slow, passive eruptions that build the classic conical shape of volcanoes like Mt Fuji, and on the other they're violently explosive, as we've seen in Tonga.

There are two factors that can lead to a highly explosive eruption, and although it's still too early to say definitively, it appears both factors may have been at play on Saturday.

Space to play or pause, M to mute, left and right arrows to seek, up and down arrows for volume.

The first is a high concentration of pressurised water vapour and gases in the magma.

When that magma hits the surface from deep underground, there's a sudden release of pressure "like opening a champagne bottle", which causes the gases to explosively expand, blasting apart the magma or lava in the process.

In the case of Hunga Tonga-Hunga Ha'apai, researchers had previously looked at the chemical composition of the volcano's lava sediment from an eruption in 2009.

They found the lava had ingredients for a powerful explosion, according to Heather Handley, a volcanologist from Monash University who was involved with that research.

"We could see from the chemistry of the rocks that the magma of that eruption was moving to the surface quickly and keeping hold of its gas as well," Dr Handley said.

YOUTUBEA demonstration of how heat and salt water create an explosive reaction

The second factor that made the Tongan volcano so explosive was that it was a sub-surface volcano — its lava vent was under the ocean.

When magma hits water, it causes an explosive interaction between the two as the water rapidly flashes to steam, Professor Bryan said.

"It's the external addition of the water and the heat of the magma coming into contact with it," he said.

"That flashes steam and that's driven the explosion."

The volcano's vent was above water before disappearing below sea level just a few days (or hours) prior to Saturday's catastrophic eruption, according to Dr Handley.

"The satellite images, if you compare from the 6th of January to two hours before the eruption, somewhere in that time frame the middle cone had gone," she said.

A smaller eruption may have blown apart the cone, allowing the incursion of seawater into the vent, which then catalysed the larger eruption.

But Professor Bryan suspects an underwater slip or collapse may have magnified the eruption and caused the tsunami that went with it.

"You need to displace ocean water to make tsunamis," he said.

"It's more than just the eruption. Something else has happened underwater that's triggered this explosion."

Was the eruption predicted?

The Hunga Tonga-Hunga Ha'apai volcano was on a roughly 1,000-year eruption cycle, according to high-temperature geochemist Oliver Nebel of Monash University.

But that doesn't mean we could have pinpointed with any real accuracy when it was going to erupt.

"We know … it's due [to erupt], but that could mean yesterday or it could be in 100 years," Dr Nebel said.

But there were some signs Hunga Tonga-Hunga Ha'apai was becoming more active, he said.

"The volcano had erupted in recent days in the lead-up to the massive eruption."

Dr Handley said the volcano entered a phase of increased activity sometime around December 19-20.

"In the past few weeks, you've been seeing what we call phreatomagmatic eruptions, where water and magma are coming into contact," she said.

"You get these dark feathered plumes that come out."

According to the database of the Global Volcanism Program, gas steam and ash plumes had risen at least 12.2 kilometres into the air by late December, but activity had "significantly decreased" by early January.

The difficulty in evacuating people when volcanoes enter more active phases is that often they may settle down again without a catastrophic eruption, Dr Nebel said.

Evacuating people any time a volcano showed signs of activity would not only be costly, but it would lead to an erosion of public trust in scientists, he added.

Will it erupt again soon?

When a volcano like this erupts, it often happens as a series of eruptions, rather than a one-off.

Records from the Global Volcanism Program show that the last period of activity at Hunga Tonga-Hunga Ha'apai, which began in December 2014, lasted just over a year.

During that period a new island was formed, about 120 metres high and about 2 kilometres long.

Dr Nebel said he suspected there would likely be more eruptions in the near future.

"I think it will likely erupt again in the coming days, weeks, months," he said.

"It's really hard, slash impossible, to predict whether it will be the same severity."

A huge eruption like this one may mean that any following eruptions will be less intense; however, again, there are no guarantees.

The problem is that the magma chamber can be tens of kilometres deep, and there's no way of knowing how much more magma is still in the chamber.

"The only thing we can say is that it has erupted now, so the likelihood of there being much more underneath is low, but we have seen [multiple large eruptions] before in the past," Dr Nebel said.

Similarly, Dr Handley said it was "impossible to tell" at this point whether we had seen the biggest eruption, or if there were more to come.

Professor Bryan said if there was an underwater landslide that precipitated the eruption, that may actually be good news in terms of future eruptions.

"Hopefully if there was a landslide or whatever happened on Saturday, it's stabilised the slopes to some extent," he said.

"[In that case] we may have some explosions or tall columns, but we're not going to get the tsunamis."

Though the fallout and potential death toll is still unknown, Professor Bryan said the earlier eruptions at least gave the people of Tonga some forewarning of what may have been coming.

He also said the fact it happened in daylight was a small positive.

"By the sounds of it, most people saw the early signs. Obviously there was a sonic boom and they'd seen the columns from the weeks before.

"If this happened like three hours later in the middle of the night [when] people are asleep, it could have been a lot worse."

Are there other volcanoes like this to watch out for?

Volcanoes like Hunga Tonga-Hunga Ha'apai are part of the Pacific Ring of Fire — a roughly 40,000km line around the Pacific Ocean tracing the edge of tectonic plates, where a large share of the world's volcanoes are found.

However, these have what is referred to as an "independent magmatic plumbing system", Dr Nebel said.

What that means is that their magma chambers and any conduits and vents are in no way connected to other volcanoes, and the eruption of one doesn't precipitate the eruption of any others.

Across the world there are more than 1,300 active volcanoes, but active doesn't mean erupting now, according to Dr Handley.

"To be active, we say they erupted in the last 10,000 years," she said.

In any week there are around 20 volcanoes showing signs of activity, according to Professor Bryan.

The Global Volcanism Program listed 46 volcanoes as "in continuing eruptions status" as of December 9, 2021.

A number of these are in Australia's Pacific neighbours, including Papua New Guinea, Solomon Islands and Tonga.

As we've seen, predicting which volcanoes may be an imminent threat to life can prove extremely difficult, but volcano experts say more monitoring and tsunami early warning systems can help.

"All of these volcanoes need monitoring, because our ability to predict these eruptions sometimes is in the order of hours," Dr Nebel said.

abc.net.au, 18 January 2022

https://www.abc.net.au

A disinfectant made from sawdust mows down deadly microbes

2022-02-19

A new, sustainable disinfectant made from sawdust and water can knock out more than 99 percent of some disease-causing microbes, including anthrax and several strains of flu.

Widespread use of some disinfectants can cause environmental harms. For instance, chlorine-containing ones, such as bleach, can form dangerous by-products when they react with other molecules (SN: 11/25/18). Some other potentially greener disinfectants rely on a compound called phenol or its chemical lookalikes, but they can be costly and energy-intensive to make.

Some other potentially greener disinfectants rely on a compound called phenol or its chemical lookalikes, but they can be costly and energy-intensive to make.

Phenolic structures abound in wood, however, as part of the large, branching molecules that make up plant cell walls. So environmental engineer Shicheng Zhang of Fudan University in Shanghai and colleagues wondered if sawdust waste could provide a greener source of antimicrobial compounds.

The researchers cooked mixtures of water and sawdust for one hour under pressure and filtered them. Then the team tested the sawdust concoctions for their prowess at killing off the microbes Staphylococcus epidermis, a skin microbe that can cause infections in immunocompromised people, and E. coli, a gut microbe that can cause foodborne illness. Depending on a disinfectant's concentration, it could zap more than 99 percent of the microbes, the team reports in the Jan. 18 Proceedings of the National Academy of Sciences.

The disinfectant was similarly successful at inactivating anthrax and influenza viruses, the researchers found. It may also be potent against spores, a dormant form of bacteria that can be difficult to kill. Experiments showed it could inactivate the spores of a typically harmless bacteria, Bacillus subtilis.

A chemical analysis revealed that the sawdust-based soup contains high concentrations of phenol-like compounds. The pressure cooker treatment

probably breaks the wood's molecular chains, freeing up antimicrobial phenolic molecules.

Under a microscope, the scientists saw that their disinfectant damaged the cell walls of E. coli and S. epidermis. The phenolic compounds may also damage the proteins and genetic material of bacteria and viruses, Zhang says.

sciencenews.org, 19 January 2022

https://www.sciencenews.org

Greater olive oil consumption associated with lower total mortality risk

2022-01-19

Higher olive oil intake is associated with a lower risk for total and cause-specific mortality, according to a study published in the Journal of the American College of Cardiology.

This finding is based on analysis of data from the ongoing Nurses' Health Study (NHS) and the Health Professionals Follow-up Study (HPFS). A total of 60,582 women and 31,801 men without a history of cardiovascular disease (CVD) or cancer at baseline were included.

Dietary intake of over 130 items was assessed via a validated semiquantitative food frequency questionnaire (FFQ) administered every 4 years. The baseline year used for analysis of both studies was 1990, when olive oil consumption was first included in the FFQs.

Participants' mean olive oil consumption increased from 1.6 g/d in 1990 to approximately 4 g/d in 2010.

Participants' mean olive oil consumption increased from 1.6 g/d in 1990 to approximately 4 g/d in 2010. Margarine consumption decreased from approximately 12 g/d in 1990 to approximately 4 g/d in 2010. Consumption of other fats was stable. After 28 years of follow-up, 36,856 deaths were recorded (22,768 in the NHS and 14,076 in the HPFS).

After adjustment for demographic and lifestyle factors, the pooled multivariable-adjusted hazard ratios (HR) for participants in the highest category of olive oil consumption (>0.5 tbsp/day or >7 g/d), compared with those in the lowest category (never or <1 per month), were 0.81 for total mortality (95% CI, 0.78-0.84), 0.81 for cardiovascular mortality (95% CI, 0.75-0.87), 0.83 for cancer mortality (95% CI, 0.78-0.89), 0.71 for neurodegenerative mortality (95% CI, 0.64-0.78), and 0.82 for respiratory mortality (95% CI, 0.72-0.93). For each additional 5-gram increase in olive

oil intake as a continuous variable, significant inverse associations for total mortality and cause-specific mortality were found.

Sensitivity analyses that adjusted for additional socioeconomic factors did not substantially change the results. Pooled HR for total mortality for high vs low olive oil intake was 0.81 (95% CI, 0.78-0.84).

Individuals of Southern European and/or Mediterranean ancestry had greater olive oil consumption and a 6% (HR, 0.94; 95% CI, 0.92-0.96) lower risk of total mortality, compared with the 4% risk reduction in the non-Mediterranean ancestry subgroups (per each 5-gram increase in olive oil intake).

The researchers estimated that substituting 10 g/d of margarine with 10 g/d of olive oil was associated with a 13% lower risk of total mortality (HR, 0.87; 95% CI, 0.85-0.89). The corresponding HR estimate with butter was 0.86 (95% CI, 0.83-0.88), 0.81 for mayonnaise (95% CI, 0.78-0.84), and 0.87 for dairy fat (95% CI, 0.84-0.89).

The researchers noted several limitations to their findings, including the potential for residual confounding and the fact that participants were predominantly non-Hispanic White health professionals. The investigators also used validated self-reported FFQs and could not distinguish among different types of olive oil with varying amounts of polyphenols and other nonlipid bioactive compounds.

"Our results support current dietary recommendations to increase the intake of olive oil and other unsaturated vegetable oils in place of other fats to improve overall health and longevity," the study authors stated.

In an accompanying editorial, Susanna C. Larsson, PhD, acknowledged the health benefits of olive oil consumption, based on the current and previous studies.

"However, several questions remain," Dr Larsson wrote. "Are the associations causal or spurious? Is olive oil consumption protective for certain CVDs (e.g., stroke and atrial fibrillation) only or also for other major diseases and causes of death? What is the amount of olive oil required for a protective effect? … More research is needed to address these questions."

thecardiologyadvisor.com, 19 January 2022

https://www.thecardiologyadvisor.com

Americans tend to assume imaginary faces are male

2022-01-27

There may be a reason we see a man, rather than a maiden, in the moon. When people spot facelike patterns in inanimate objects, those faces are more likely to be perceived as male than female, researchers report in the Feb. 1 Proceedings of the National Academy of Sciences.

In experiments with over 3,800 U.S. adults recruited online, participants reviewed about 250 photos of illusory faces — in objects from potatoes to suitcases — and labeled each one as male, female or neutral. Faces were deemed male about four times as often as they were female. Both male and female participants showed that bias, with about 80 percent of participants labeling more images male than female. Only 3 percent judged more to be female than male. The remaining 17 percent of respondents were fairly evenhanded in their labels.

In follow-up experiments, participants did not show the same bias toward images of the same kinds of objects without illusory faces. That finding helped rule out the possibility that participants viewed something about the underlying objects as masculine or feminine. Computer models that scoured the illusory face photos for stereotypically masculine or feminine elements — such as more angular or curved features (SN: 6/29/01) — couldn't explain the bias, either.

Both male and female participants showed that bias, with about 80 percent of participants labeling more images male than female.

"There's this asymmetry in our perception," says study author Susan Wardle, a cognitive neuroscientist at the National Institutes of Health in Bethesda, Md. Given the most basic pattern of a face, as is seen in illusory faces, "we're more likely to see it as male, and it requires additional features to see it as female," Wardle says. She points to the fact that female emojis and Lego characters are often distinguished from their male counterparts by the addition of bigger lips, longer lashes or other feminizing features.

It's not yet clear why people perceive the basic structure of a face as male by default, Wardle says. But in a more recent study, she and her colleagues found the same gender bias in grade school kids as young as about 5 — suggesting it arises early in life.

"I was not surprised that people would assign gender to illusory faces," says Sheng He, a cognitive neuroscientist at the Chinese Academy of Sciences in Beijing who was not involved in the research. He was, however, surprised by the strength of the gender bias that Wardle's team discovered

and wonders whether people living in matriarchal societies would show the same — or perhaps the opposite — bias in their reading of faces.

sciencenews.org, 27 January 2022

https://www.sciencenews.org

Same-sex penguins hatch their first chick at New York zoo

2022-02-02

A pair of same-sex penguins hatched their first chick at Rosamond Gifford Zoo in New York and the parents are caring for it like pros.

The two male Humboldt penguins (Spheniscus humboldti) named Elmer and Lima were given an egg to incubate because the egg's biological parents have a history of accidentally breaking them. A chick hatched from the egg on Jan. 1 and is doing just fine with its same-sex parents, who keep the newborn penguin warm and fed.

A chick hatched from the egg on Jan. 1 and is doing just fine with its same-sex parents, who keep the newborn penguin warm and fed.

"It continues to be brooded and cared for by both Elmer and Lima, who are doing a great job," Ted Fox, the zoo's director, said in a statement.

Elmer and Lima paired up and built a nest for the breeding season. They didn't have any eggs of their own for obvious reasons, but they defended their territory and behaved as breeding penguins would, so zookeepers gave them a dummy egg to see whether they cared for it properly.

"Some pairs, when given a dummy egg, will sit on the nest but leave the egg to the side and not incubate it correctly, or they'll fight for who is going to sit on it when," Fox said. "That's how we evaluate who will be good foster parents — and Elmer and Lima were exemplary in every aspect of egg care." The zoo swapped the dummy egg for a fertile egg and it hatched without any issues.

This isn't the first time zoos have found success using same-sex penguins as foster parents. Both male pairs and female pairs have previously hatched chicks at a number of zoos, such as in the Central Park Zoo in New York City and the Oceanogràfic Valencia aquarium in Spain. Two male black-footed penguins (Spheniscus demersusin) in DierenPark Amersfoort zoo in the Netherlands were apparently so keen to be parents that they stole an egg from another nearby pair to raise themselves, Live Science previously reported.

Penguins of the same sex often come together as pairs. Male and female penguins share the same responsibilities when it comes to raising chicks, so there's no reason why same-sex pairs can't complete all the responsibilities of parenting, according to the Museum Studies Blog at Tufts University in Massachusetts.

Same-sex penguin pairs show that the idea of "family" is not species-specific and that in many cases, non-traditional families do a wonderful job of child-rearing, Fox said.

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Using melatonin for sleep is on the rise, study says, despite potential health harms

2022-02-02

(CNN)More and more adults are taking over-the-counter melatonin to get to sleep, and some of them may be using it at dangerously high levels, a new study has found.

While overall use among the United States adult population is still "relatively low," the study does "document a significant many-fold increase in melatonin use in the past few years," said sleep specialist Rebecca Robbins, an instructor in the division of sleep medicine for Harvard Medical School, who was not involved in the study.

The study, published Tuesday in the medical journal JAMA, found that by 2018 Americans were taking more than twice the amount of melatonin they took a decade earlier. Experts worry that the pandemic's negative impact on sleep may have further increased the widespread reliance on sleeping aids, Robbins said.

"Taking sleep aids has been linked in prospective studies with the development of dementia and early mortality," she said.

Melatonin has been linked to headache, dizziness, nausea, stomach cramps, drowsiness, confusion or disorientation, irritability and mild anxiety, depression and tremors, as well as abnormally low blood pressure. It can also interact with common medications and trigger allergies.

"Taking sleep aids has been linked in prospective studies with the development of dementia and early mortality," she said.

While short term use for jet lag, shift workers and people who have trouble falling asleep appears to be safe, long-term safety is unknown, according to the National Center for Complementary and Integrative Health at the National Institutes of Health.

Larger dose, little regulation

Since 2006, a small but growing subset of adults are taking amounts of melatonin that far exceed the 5 milligram a day dosage that is typically used as a short term treatment, the study found.

However, pills for sale may contain levels of melatonin that are much higher than what is advertised on the label. Unlike drugs and food, melatonin is not fully regulated by the US Food and Drug Administration, so there are no federal requirements that companies test pills to be sure they contain the amount of advertised melatonin.

"Previous research has found that that melatonin content in these unregulated, commercially available melatonin supplements ranged from - 83% to +478% of the labeled content," said Robbins, who coauthored the book "Sleep for Success! Everything You Must Know About Sleep But are Too Tired to Ask."

Nor are there any requirements that companies test their products for harmful hidden additives in melatonin supplements sold in stores and online. Previous studies also found 26% of the melatonin supplements contained serotonin, "a hormone that can have harmful effects even at relatively low levels," according to the National Center for Complementary and Integrative Health, a department of the National Institutes of Health.

"We cannot be certain of the purity of melatonin that is available over the counter," Robbins said.

Taking too much serotonin by combining medications such as antidepressants, migraine medications and melatonin can lead to a serious drug reaction. Mild symptoms include shivering and diarrhea, while a more severe reaction can lead to muscle rigidity, fever, seizures and even death if not treated.

It's a hormone, not an herb

Because it is purchased over the counter, experts say many people view melatonin as an herbal supplement or vitamin. In reality, melatonin is a hormone made by the pineal gland, located deep within the brain, and released into the bloodstream to regulate the body's sleep cycles.

"There is a view that if it's natural, then it can't hurt," Robbins told CNN in a prior interview on the impact of melatonin on children. "The truth is, we just really don't know the implications of melatonin in the longer term, for adults or kids."

Another reality: Studies have found that while using melatonin can be helpful in inducing sleep if used correctly -- taking it at least two hours before bed -- but the actual benefit is small.

"When adults took melatonin, it decreased the amount of time it took them to fall asleep by four to eight minutes," Dr. Cora Collette Breuner, a professor in the department of pediatrics at Seattle Children's Hospital at the University of Washington, told CNN last March.

"So for someone who takes hours to fall asleep, probably the better thing for them to do is turn off their screens, or get 20 to 40 minutes of exercise each day, or don't drink any caffeinated products at all," Breuner said.

"These are all sleep hygiene tools that work, but people are very reticent to do them. They rather just take a pill, right?"

Training your brain to sleep

There are other proven sleep tips that work just as well, if not better than sleeping aids, experts say. The body begins secreting melatonin at dark. What do we do in our modern culture? Use artificial light to keep us awake, often long past the body's normal bedtime.

Research has found that the body will slow or stop melatonin production if exposed to light, including the blue light from our smartphones, laptops and the like.

"Any LED spectrum light source may further suppress melatonin levels," said Dr. Vsevolod Polotsky, who directs sleep basic research in the division of pulmonary and critical care medicine at Johns Hopkins University School of Medicine, in a prior CNN interview.

So ban those devices at least an hour before you want to fall asleep. Like to read yourself to sleep? That's fine, experts say, just read in a dim light from a real book or use an e-reader in night mode.

"Digital light will suppress the circadian drive," Polotsky said, while a "dim reading light will not."

Other tips include keeping your bedroom temperature at cooler temperatures of about 60 to 67 degrees Fahrenheit (15 to 20 degrees Celsius). We sleep better if we're a bit chilly, experts say.

Sign up for the Sleep, But Better newsletter series. Our seven-part guide has helpful hints to achieve better sleep.

Set up a bedtime ritual by taking a warm bath or shower, reading a book or listening to soothing music. Or you can try deep breathing, yoga, meditation or light stretches. Go to bed and get up at the same time each day, even on weekends or your days off, experts say. The body likes routine.

If your doctor does prescribe melatonin to help with jet lag or other minor sleep issues, keep the use "short-term," Robbins said.

If you are planning to use melatonin for a short-term sleep aid, try to purchase pharmaceutical grade melatonin, she advised. To find that, look for a stamp showing the product has been tested by the independent, nonprofit US Pharmacopoeial Convention Dietary Supplement Verification Program.

edition.cnn.com, 2 February 2022

https://www.edition.ccn.com

Alien hammerhead flatworm named after pandemic

2022-02-02

Scientists have discovered an alien hammerhead flatworm species that looks a bit like a miniature king cobra, or perhaps an itty-bitty snake with a moustache. The researchers found the tiny creatures hunting snails in France and Italy, and they've named the invaders after the COVID-19 pandemic, according to a new study.

These new hammerhead flatworms are among two newly described species found in countries that researchers believe are not part of their native range so they were very likely introduced there by humans.

Scientists dubbed the first soil-dwelling predator species Humbertium covidum, with covidum being a reference to COVID-19 as an "homage to the numerous casualties" of the pandemic and because much of the 55-page study was written during lockdowns.

"Due to the pandemic, during the lockdowns most of us were home, with our laboratory closed. No field expeditions were possible," lead author

Typically found in warm parts of Asia, hammerhead flatworms are often accidentally transported around the world by humans in soil from the plant trade.

Jean-Lou Justine, a professor at the Muséum National d'Histoire Naturelle (National Museum of Natural History) in Paris, said in a statement. "I convinced my colleagues to gather all the information we had about these flatworms, do the computer analyses, and finally write this very long paper." PLAY SOUND

Typically found in warm parts of Asia, hammerhead flatworms are often accidentally transported around the world by humans in soil from the plant trade. These flatworms can reproduce asexually, so one hammerhead flatworm can give birth to offspring without a mate, making it easier for them to establish themselves as an invasive species — organisms that cause ecological or economic damage to an environment where they are not native, Live Science previously reported.

Humbertium covidum were discovered in two gardens in Pyrénées-Atlantiques in southwest France and a garden in Veneto in northern Italy, although the species likely originated in Asia. Some reports indicate the species may also be in Russia, China and Japan, according to the study. The researchers discovered the second species, which they named Diversibipalium mayottensis, on Mayotte, a French island off the east coast of Africa in the Indian Ocean. This species could have been introduced to Mayotte from Madagascar.

The researchers studied the anatomy and morphology of the flatworms and carried out genetic analysis to formally describe the new species. Diversibipalium mayottensis have a unique green-blue iridescence, and the researchers determined the species belongs to a hammerhead sister group, distinct from all other hammerhead flatworms. This species could therefore be important to understanding the evolutionary history of hammerhead flatworms.

Both of the new species measure about 1.2 inches (3 centimeters) long. That's small for hammerhead flatworms, which can grow to be more than 15 inches (40 centimeters) long, and may explain why the new species have previously been overlooked by researchers, according to the statement.

The findings were published Feb. 1 in the journal PeerJ.

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https://www.livescience.com

US airlines are warning 5G could ground planes. Could this happen in Australia?

2022-01-19

Telecoms companies AT&T and Verizon have delayed turning on new mobile phone towers around runways at some US airports in response to airlines warning of an impending aviation "crisis" that could disrupt flights and strand thousands of passengers every day.

Key points:

- US airlines say 5G frequencies can interfere with sensitive airplane instruments
- US telecoms companies have delayed rolling out the network around some airports
- 5G is not an issue for Australian airports, the regulator says

For months now, US airlines and the aviation regulator have been negotiating with the telecoms industry and the communication regulator about the rollout of the 5G mobile communications network around US airports.

The 5G service occupies a band of the electrometric spectrum adjacent to the one used by sensitive airplane instruments, and could interfere with their proper function.

Delayed twice already, the new network was scheduled to go live on Wednesday (local time).

But following a last-minute appeal from US airline chiefs, telecoms companies have agreed to further delays in some areas.

With all this alarm in the US, you may be wondering how 5G is going to affect Australian airports and air travel.

The good news is that, according to the Civil Aviation Safety Authority (CASA), 5G is not an issue for Australian airports.

So how much disruption should we expect? What's the risk to aircraft? And why isn't it an issue here?

Some experts say 5G could blind a plane's automatic landing system

The good news is that, according to the Civil Aviation Safety Authority (CASA), 5G is not an issue for Australian airports.

Curiosities

FEB. 04, 2022

You've probably heard of 5G, the fifth generation of mobile network technology that uses higher frequencies of electromagnetic waves than the previous 4G network.

These waves allow much larger amounts of data to be transferred, which means faster downloads, better quality videos, and so on.

But there's a catch: other devices are already using parts of this sought-after spectrum.

Namely, the devices that prevent planes from crashing.

Radio altimeters measure the distance of a plane above the ground by pinging an electromagnetic pulse and listening for the reflected signal.

They operate at frequencies of 4.2-4.4 GHz.

In the US, the adjacent spectrum of 3.7-3.98 GHz (known as the C-band) has been sold to telecoms providers, for use in the new 5G networks.

The fear is these will interfere with the altimeters, blinding the instruments with signal noise.

Many passenger and cargo planes, for instance, use an automated landing procedure called "autoland" in low-visibility conditions.

Autoland relies on radio altimeters, aviation expert Geoffrey Thomas says.

"Auto-land is a major, major issue," he said.

"At the moment if autoland was not available and Los Angeles was fogged in, then they would have to divert to another airport, and this would require additional fuel and cause disruptions and extra cost."

Radio altimeters are also used to avoid head-on collisions.

In a letter to the White House on Monday (local time), US airline chiefs warned of an impending aviation "crisis" that could delay hundreds of flights and strand thousands of passengers every day.

"Unless our major hubs are cleared to fly, the vast majority of the travelling and shipping public will essentially be grounded," wrote the chief executives of American Airlines, Delta Air Lines, United Airlines, Southwest Airlines and others in a letter to the White House.

"To be blunt, the nation's commerce will grind to a halt."

They said the flight restrictions will not be limited to poor weather conditions.

"Multiple modern safety systems on aircraft will be deemed unusable, causing a much larger problem than what we knew," they wrote.

"Airplane manufacturers have informed us that there are huge swaths of the operating fleet that may need to be indefinitely grounded."

How big is the problem?

The US Federal Aviation Authority (FAA) has warned that interference substantial enough to halt the use of automated cockpit systems could lead to flight cancellations, delays or diversions in 46 of the largest metro areas in the US.

Aviation trade group Airlines for America has claimed 5G-related interference could threaten to disrupt as many as 350,000 flights per year.

That includes flights from Australia to the US, Mr Thomas says.

"The operations that could be impacted include Qantas flights from Australia to Los Angeles," he said.

But not everyone is convinced that grounding or diverting planes is necessary.

The Federal Communications Commission (FCC), the regulatory counterpart of the FAA, says there's no proof 5G will interfere with plane instruments.

Some 40 countries have authorised the use of 5G in the C-band, without a single report of harmful interference, it says.

In a recent letter, six former heads of the FCC say the FAA "threatens to derail the reasoned conclusions reached by the FCC after years of technical analysis and study."

The situation has become an interagency brawl with a lot at stake for not only airlines, but also for the US telecoms companies that collectively paid $US81.7 billion ($113 billion) for access to the C-band spectrum last year.

So … how big is the risk?

Parties on either side of the dispute disagree on the size of the risk itself.

In theory, the 220MHz gap between the top end of the 5G frequencies (3.98GHz) and the lower end of the radio altimeter range (4.2GHz) should

mean there's no interference, but studies have found this not always the case.

The US concerns focus on an October 2020 report from the Radio Technical Committee for Aeronautics (RTCA) that found "a major risk that 5G telecommunications systems in the 3.7-3.98 GHz band will cause harmful interference to radar altimeters on all types of aircraft."

Another 2020 study conducted by the Australian Communications and Media Authority (ACMA) found 5G emissions in adjacent frequencies have "some potential to cause interference under certain assumptions".

Ampalavanapillai Nirmalathas, a professor of electronic engineering at University of Melbourne, said the ACMA study showed that the risk was very low.

"In very, very rare circumstances there may be an inaccuracy in the estimation of altimeter readings due to potential inference from the bands.

"In terms of being able to generate statistical confidence, these studies are not conclusive.

"There's no way of saying how rare or how likely these things are."

Even if the risk of 5G emissions confusing an altimeter is very low, the consequences of a plane misjudging the ground are potentially catastrophic, and include death for the passengers.

Why aren't Australian airports affected?

According to CASA, there's been no reports of radio altimeter incidents linked to 5G since the telecommunications technology rolled out two years ago.

Last week, in response to the debate in the US, it published a post on its website titled "No sign of 5G interference in Australia".

One reason there have been no reports of incidents, it says, is that Australian 5G transmissions top out at 3.7GHz, which makes a larger buffer with the frequencies used by radio altimeters.

This is fairly standard internationally — India's 5G services go up to 3.6GHz, while Europe and the UK's top out at 3.8GHz.

CASA says it's monitoring the situation and urges pilots to report any anomalies.

abc.net.au, 19 January 2022

https://www.abc.net.au

Chemical from gut bacteria promotes obesity

2022-01-31

Researchers have identified an obesity-promoting chemical that intestinal bacteria produce. The chemical, called delta-valerobetaine, suppresses the liver's capacity to oxidize fatty acids.

The findings appear in Nature Metabolism.

"The discovery of delta-valerobetaine gives a potential angle on how to manipulate our gut bacteria or our diets for health benefits," says co-senior author Andrew Neish, professor of pathology and laboratory medicine at Emory University School of Medicine.

"We now have a molecular mechanism that provides a starting point to understand our microbiome as a link between our diet and our body composition," says Dean Jones, professor of medicine at Emory University School of Medicine and co-senior author of the paper.

The chemical, called delta-valerobetaine, suppresses the liver's capacity to oxidize fatty acids.

The bacterial metabolite delta-valerobetaine was identified by comparing the livers of conventionally housed mice with those in germ-free mice, which are born in sterile conditions and sequestered in a special facility. Delta-valerobetaine was only present in conventionally housed mice.

In addition, the authors showed that people who are obese or have liver disease tend to have higher levels of delta-valerobetaine in their blood. People with BMI > 30 had levels that were about 40% higher. Delta-valerobetaine decreases the liver's ability to burn fat during fasting periods. Over time, the enhanced fat accumulation may contribute to obesity.

Specific varieties of bacteria may produce more delta-valerobetaine than others, and it is possible that an individual whose microbiome contains more of these bacteria will experience more pressure on their metabolism through suppression of mitochondrial function., Neish says.

"There are a number of implications that we are following up on," he says.

Another question is: what factors in human diet—meal timing or composition—drive higher production of valerobetaine? In mice, delta-valerobetaine promotes obesity and fat accumulation in the liver when the mice are fed a high fat and high sugar diet typical for people in Western countries, but not a standard mouse diet.

Delta-valerobetaine is produced from the amino acid lysine via known microbial enzymes, so a diet high in lysine could also increase the levels of delta-valerobetaine, Neish says. Delta-valerobetaine is a precursor of TMAO (trimethylamine N-oxide), which researchers at the Cleveland Clinic have shown to be associated with cardiovascular disease. How delta-valerobetaine affects cardiovascular disease risk should be investigated further, the authors say.

Our bodies' sensitivity to delta-valerobetaine may have evolved as a mechanism for promoting fat storage under conditions when it is advantageous—when food was scarce and access to it was irregular, says Ken Liu, a former molecular and systems pharmacology graduate student who is the first author of the paper. (Liu has now earned his doctorate.)

When Liu first identified delta-valerobetaine, it was a relatively obscure molecule. Since then, several papers have appeared on its metabolic significance.

"We had to figure out its structure and how to synthesize it, because we couldn't simply buy it from a supplier," he says. "And we had no idea what it did. We thought: it looks like carnitine, so it might interact with the carnitine shuttle pathway."

Carnitine, sometimes taken as a dietary supplement, acts as a shuttle, transferring fatty acids into mitochondria for use as fuel—and delta-valerobetaine slows the shuttle down. An implication of the team's research is that intestinal bacteria may influence whether someone trying to lose weight would benefit from carnitine supplementation.

"This type of information could potentially help someone develop a personalized strategy for weight loss," Liu says. "But there are a lot of things we need to understand better about how delta-valerobetaine functions in context."

Germ-free mice were housed in the Emory Gnotobiotic Animal Core, and their metabolites were analyzed in the Emory Integrated Metabolomics/Lipidomics Core. Researchers tested clinical samples obtained from the Emory-Georgia Tech Predictive Health Institute and Center for Health

Discovery and Well Being, as well as samples from a fecal microbiome transplant study.

Support for the work came from the National Institute of General Medical Sciences, the National Institute of Environmental Health Sciences, the National Institute of Diabetes and Digestive and Kidney Diseases, the National Institute on Alcohol Abuse and Alcoholism, and the National Institute of Allergy and Infectious Diseases.

futurity.org, 31 January 2022

https://www.futurity.org

CHEMWATCH

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FEB. 04, 2022

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PHARAMACEUTICAL/TOXICOLOGY

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