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

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ASIA PACIFIC

Model code of practice: managing the risks of respirable crystalline silica from engineered stone in the workplace

2021-10-26

This model Code of Practice provides practical information on how to manage health and safety risks associated with respirable crystalline silica from engineered stone in your workplace.

Use this model Code of Practice if you are a duty holder and you:

- manage the health and safety risks associated with working with engineered stone
- design, manufacture, import or supply engineered stone
- fabricate, install, maintain, remove or dispose of engineered stone

This model Code applies to all types of work and all workplaces covered by the model Work Health and Safety Act. The code covers:

- who has health and safety duties in relation to working with engineered stone
- how to identify, manage and control the risks of working with engineered stone
- the workplace exposure standard for respirable crystalline silica
- health monitoring
- air monitoring, and
- clean-up and disposal of silica dust maintenance, refurbishment or removal of engineered stone

To have legal effect in a jurisdiction, the model Code of Practice must be approved as a code of practice in that jurisdiction. Check with the relevant regulator to determine if this is the case.

Check with your WHS regulator to find out if this Code of Practice has legal effect in your jurisdiction

Downloads

- [MODEL CODE OF PRACTICE - MANAGING THE RISKS OF RESPIRABLE CRYSTALLINE SILICA FROM ENGINEERED STONE IN THE WORKPLACE. PDFPDF](#)

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1.04 MB

- [MODEL CODE OF PRACTICE - MANAGING THE RISKS OF RESPIRABLE CRYSTALLINE SILICA FROM ENGINEERED STONE IN THE WORKPLACE. DOCXDOCX](#)

1.2 MB

Publication date

26 Oct 2021

Safe Work Australia, 26 October 2021

<https://www.safeworkaustralia.gov.au/doc/model-code-practice-managing-risks-respirable-crystalline-silica-engineered-stone-workplace>

Amendments to Occupational Safety and Health Act to protect workers against occupational risks

2021-10-27

KUALA LUMPUR (Oct 27): The Occupational Safety and Health (Amendment) Bill 2020 is not only aimed at improving the safety, health and welfare of workers but also protecting them from safety and health risks while working.

Human Resource Minister Datuk Seri M Saravanan, when tabling the bill for the second reading in the Dewan Rakyat on Wednesday, said it is also to ensure that the country's labour laws including those related to occupational safety and health, were in line with the provisions in the universal instruments, particularly the Occupational Safety and Health Convention 1981 (C155).

The bill to amend the Occupational Safety and Health Act 1994 (Act 514) contains 55 clauses, including the addition of 27 new sections, removal of two sections and amending 35 existing sections.

Read More

The Edge Markets, 27 October 2021

<https://www.theedgemarkets.com/article/amendments-occupational-safety-and-health-act-protect-workers-against-occupational-risks-%E2%80%94>

The bill to amend the Occupational Safety and Health Act 1994 (Act 514) contains 55 clauses, including the addition of 27 new sections, removal of two sections and amending 35 existing sections.

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Guide for managing the risks of working in heat

2021-10-28

Overview

This guide provides information on how to manage the risks associated with working in heat and what to do if a worker begins to suffer from a heat-related illness.

Audience

People in control of the workplace, such as managers and supervisors, and workers all have duties under WHS laws to manage risks to worker health and safety, such as those associated with working in heat.

This guide is useful for employers and workers in the transport, postal/warehousing, construction and public administration and safety industries, as well as labourers and protective service workers.

Related materials

- [First aid for heat-related illness](#)
- [Checklist for risk-managing heat in the workplace](#)
- Code of practice: [Managing the Work Environment and Facilities](#)
- Code of practice: [Work health and safety consultation, co-operation and co-ordination](#)
- Code of practice: [How to manage work health and safety risks](#)
- Code of practice: [First aid in the workplace](#)
- Guidance material: [Guide on exposure to solar ultraviolet radiation](#)
- [Workplace Health and Safety Queensland's heat stress basic calculator](#)
- Bureau of Meteorology's [Heatwave Service for Australia](#)

Downloads

- [GUIDE FOR MANAGING THE RISKS OF WORKING IN HEAT.PDF](#) PDF
272.04 KB
- [GUIDE FOR MANAGING THE RISKS OF WORKING IN HEAT.DOCX](#) DOCX
651.95 KB

Publication date

8 Dec 2017

Modified date

20 Oct 2021

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Read More

Safe Work Australia, 28 October 2021

<https://www.safeworkaustralia.gov.au/doc/guide-managing-risks-working-heat>

Hydrogen cyanamide reassessment

2021-10-29

We are reassessing the use of hydrogen cyanamide, a restricted spray ingredient used in commercial orchards. This reassessment is open for public submission.

Submissions close on Monday 20 December 2021 at 5.00 pm.

Hydrogen cyanamide has been used in Aotearoa New Zealand since 1988. It is used mainly in kiwifruit orchards to promote bud growth. It is also used in some apple, cherry, apricot, and kiwiberry crops, but to a lesser extent.

There are six hydrogen cyanamide products approved for use. They are restricted to commercial use, and can only be used by trained professionals.

Why we are reassessing hydrogen cyanamide

We have assessed the risks to people and the environment, and economic benefits of hydrogen cyanamide use in New Zealand. Our assessment was based on risk analyses, economic assessments, information on alternative bud-break agents, and general comments we received from industry groups, iwi, and individuals.

Other significant information included a European Food Safety Authority review, and assessments published by regulators in the United States and Europe.

Human health risks

Hydrogen cyanamide is toxic to the reproductive system and thyroid if people are exposed to it over time. It is a suspected carcinogen, and is corrosive to skin and eyes. The risks to operators are of concern.

Environmental health risks

There are risks to the aquatic environment, non-target plants, pollinators, non-target arthropods, and birds. Risks can be mitigated by using buffer

This guide is useful for employers and workers in the transport, postal/warehousing, construction and public administration and safety industries, as well as labourers and protective service workers.

This reassessment is open for public submission.

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zones, restrictions on application rate and timing, and prohibiting use when bees are present.

Impact on Māori culture and social wellbeing

The continued use of hydrogen cyanamide is likely to enhance Māori economic and social development in terms of prosperity, livelihoods, and lifestyles. But it is likely to adversely affect the relationship of Māori and their culture and traditions with their environment and taonga, including culturally significant species, resources, and places, and the customary values, practices and uses associated with these taonga.

In mid-2021 we held hui in kiwifruit-growing regions to gather information for our Māori impact assessment report. In advance of the hui, we provided two documents summarising the key issues identified in our risks and benefits assessments.

Read More

EPA New Zealand, 29 October 2021

<https://www.epa.govt.nz/public-consultations/open-consultations/hydrogen-cyanamide-reassessment/>

AMERICA

How chemical companies avoid paying for pollution

2021-10-20

"They're not Band-Aids," Mr. Long said. "They're long-term, robust solutions."

One humid day this summer, Brian Long, a senior executive at the chemical company Chemours, took a reporter on a tour of the Fayetteville Works factory.

Mr. Long showed off the plant's new antipollution technologies, designed to stop a chemical called GenX from pouring into the Cape Fear River, escaping into the air and seeping into the ground water.

There was a new high-tech filtration system. And a new thermal oxidizer, which heats waste to 2,000 degrees. And an underground wall — still under construction — to keep the chemicals out of the river. And more.

"They're not Band-Aids," Mr. Long said. "They're long-term, robust solutions."

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Yet weeks later, North Carolina officials announced that Chemours had exceeded limits on how much GenX its Fayetteville factory was emitting. This month, the state fined the company \$300,000 for the violations — the second time this year the company has been penalized by the state's environmental regulator.

GenX is part of a family of chemicals called per- and polyfluoroalkyl substances, or PFAS. They allow everyday items — frying pans, rain jackets, face masks, pizza boxes — to repel water, grease and stains. Exposure to the chemicals has been linked to cancer and other serious health problems.

Read More

New York Times, 20 October 2021

<https://www.nytimes.com/2021/10/20/business/chemours-dupont-pfas-genx-chemicals.html>

EPA's PFAS strategic roadmap sets broad and ambitious goals

2021-10-22

Near- and Longer-Term Objectives Expected to Impact Wide Range of Industries

On October 18, 2021, the Environmental Protection Agency (EPA) released its PFAS Strategic Roadmap: EPA's Commitments to Action 2021-2024. For the first time under the Biden Administration, the Roadmap expands the policies of the Agency's 2019 Action Plan and accelerates its timeline with distinct objectives and benchmarks between 2021 and 2024. In no uncertain terms, the Agency intends to "leverage the full range of statutory authorities" through a range of key actions that take direct steps toward the regulation of PFAS under the Toxic Substances Control Act (TSCA), Resource Conservation and Recovery Act (RCRA), Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), Safe Drinking Water Act (SDWA), and Clean Water Act (CWA). EPA's whole-of-agency strategy focuses on objectives to address three main goals: Research, Restrict, Remediate.

Who will be affected by the plan? In a word, everyone. It will impact manufacturers of PFAS, companies that utilize PFAS in their products (metal finishing, paper making, carpets and textiles), wastewater and drinking water utilities, airports and other facilities that utilize Aqueous

For the first time under the Biden Administration, the Roadmap expands the policies of the Agency's 2019 Action Plan and accelerates its timeline with distinct objectives and benchmarks between 2021 and 2024.

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Film Forming Form (AFFF), lending and financial institutions with industrial clients, private equity firms purchasing and selling companies with current or past PFAS use, and manufacturers and importers of products that inadvertently have PFAS in their goods.

Key Short-Term Objectives With Imminent Impact

Although there are many objectives to the plan, we wanted to highlight a few of the key objectives:

- **Research** – The Office of Chemical Safety and Pollution Prevention has already published a [national PFAS testing strategy](#) and by the end of 2021 expects to issue the first round of test orders under TSCA § 4 requiring companies to conduct and fund studies of 24 PFAS. Also before the end of 2021, EPA expects to issue the Fifth Unregulated Contaminant Monitoring Rule (UCMR 5) final rule. As proposed, UCMR 5 would undertake nationwide monitoring for 29 PFAS for regulation under the SDWA. Because information serves as the foundation underpinning the Roadmap's goals, these and the other Research objectives aim to achieve an exponential expansion of data and public knowledge about PFAS presence and effects.
- **Restrict** – In Spring 2022, EPA intends to propose enhanced reporting of information required under TSCA by designating PFAS on the TRI list as "Chemicals of Special Concern" and removing certain notification exemptions. This objective will substantially expand the number of companies required to report and notify PFAS under TRI, providing EPA and the public with a broader range of targets for restriction under permits and other regulations.
- **Remediate** – In Spring 2022, EPA plans to propose designation of PFOA and PFOS as hazardous substances under CERCLA, with the intent to finalize the designation by Summer 2023. Long expected, this designation will launch a series of actions under CERCLA, including sampling and response activities, potential reopening of Superfund sites. Designation will also trigger for any facility to report PFOS and PFOA releases over reportable quantities, and it will also give states more authority for regulation and enforcement.

[Read More](#)

JD Supra, 22 October 2021

<https://www.jdsupra.com/legalnews/epa-s-pfas-strategic-roadmap-sets-broad-5380160/>

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Makers of 20 PFAS will be ordered to provide EPA health data

2021-10-28

Companies making 20 PFAS will receive orders before the end of this year requiring them to provide the EPA information about ways those chemicals may affect human health, the agency's top chemicals official told a House subcommittee Wednesday.

The required tests will help the Environmental Protection Agency understand more than 2,000 per- and polyfluoroalkyl substances, or PFAS, said Michal Ilana Freedhoff, the agency's assistant administrator for chemical safety and pollution prevention.

More data orders will come in the months and years ahead, Freedhoff told the House Committee on Energy and Commerce's Subcommittee on Environment and Climate Change. The information will help the EPA decide whether to group similar PFAS together and which PFAS deserve closer analysis or possibly restriction.

The grouping strategy is essential, because the agency can't address thousands of PFAS focusing on one at a time, Freedhoff said.

But Rep. Earl L. "Buddy" Carter (R-Ga.) said he's concerned that Congress and the EPA are moving to ban all of PFAS even though some are critical for medical purposes and other uses.

PFAS are used to make thousands of products ranging from catheters to fuel cells to non-stick pans. Yet growing scientific evidence shows that exposure to certain levels of specific PFAS can harm human health, Freedhoff's written [testimony](#) said. Some PFAS remain in the environment because sunlight, weather, and most microbes don't break them down.

The orders Freedhoff described are one of many actions her office is taking to help implement the EPA's three-year [roadmap](#) to control and study these chemicals that it released Oct. 18. Her comments came at an oversight hearing on the EPA's implementation of the Toxic Substances Control Act or TSCA, as amended in 2016.

Money, Staff Needed

The full committee's top Republican, Rep. Cathy McMorris Rodgers (Wash.), was among those who blasted the agency for blocking the nation's economic success as it implements the chemicals law.

The grouping strategy is essential, because the agency can't address thousands of PFAS focusing on one at a time, Freedhoff said.

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“We are in the midst of a domestic supply chain crisis. We cannot afford letting an inefficient and unreasonable TSCA implementation further devastate innovation and American competitiveness,” she said.

Rodgers and other Republicans raised concerns about the EPA’s growing regulation of manufactured goods, such as electrical equipment containing chemicals, and increased oversight over new chemicals that’s delaying their entry into commerce.

“I personally don’t believe innovation and safety are exclusive,” Freedhoff said.

But inadequate staff and resources are a problem, she said. “We estimate that we have less than 50% of the resources necessary to implement the new chemicals program as Congress had intended.”

“I was shocked to learn when I arrived at the agency that the EPA had never once made a budget request that meaningfully added any new funding to reflect its new statutory responsibilities,” Freedhoff said.

The president’s requested budget for the EPA includes a \$15 million increase for chemical risk reviews and reductions, for a total of \$75.5 million, which would allow the agency to add 90 employees.

[Read More](#)

Bloomberg Law, 28 October 2021

<https://news.bloomberglaw.com/environment-and-energy/asbestos-limits-to-be-first-of-10-chemical-rules-epa-to-propose>

EUROPE

River basin planning process overview

2021-10-22

1. Introduction

This document sets out the decision making which has informed the draft update to the river basin management plans that are wholly, or partly, in England. It summarises the processes behind the update, linking to more information where appropriate.

This document also contains a description of the summary programmes of measures, and links to the ‘River basin planning programmes of measures:

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mechanisms summary’ document which details the mechanisms available to deliver these measures that underpin the achievement of the environmental objectives in river basin management plans in England.

2. River basin management plans

2.1. River basin management plans legislation (Water Environment (Water Framework Directive) Regulations 2017)

The Water Framework Directive seeks to establish an integrated approach to the protection and sustainable use of the water environment. This requires a holistic approach to managing waters, looking at the wider ecosystem and taking into account the movement of water through the hydrological cycle.

The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 transpose, for England and Wales, the Water Framework Directive as well as aspects of the Groundwater Directive and Environmental Quality Standards Directive.

The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (referred to as WFD Regulations in this document) provides a framework for managing the water environment in England.

The European Union Withdrawal Act 2018 carries over the requirements of the Water Framework Directive, into domestic law as retained EU law.

The WFD Regulations require the preparation and publication of river basin management plans; the setting of environmental objectives for groundwater and surface waters (including estuaries and coastal waters) and the devising and implementing of programmes of measures to meet those objectives.

Under the WFD Regulations, a river basin management plan must be developed for each river basin district and reviewed and updated every six years. These plans were first published in December 2009, and last updated in February 2016.

[Read More](#)

Gov.uk, 22 October 2021

<https://www.gov.uk/government/publications/river-basin-planning-process-overview/river-basin-planning-process-overview>

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INTERNATIONAL

UNEP reports assess impacts of global plastic pollution, potential solutions

2021-10-21

Two publications from the United Nations Environment Programme (UNEP) provide overview and assessment of global challenges related to marine litter and plastic waste; include set of infographics summarizing key thematic areas; book chapter proposes organizing diverse problem formulations and potential solutions to plastic pollution into a conceptual framework, considers necessary value judgments and world views

On October 21, 2021, the *United Nations Environment Programme (UNEP)* published two reports focused on providing “a complete overview of the global challenges related to marine litter and plastic waste” including an assessment of the “the magnitude and severity of marine litter and plastic pollution” as well as a review of “existing solutions and actions.” The [first report](#), “Drowning in Plastics,” contains a large set of graphic illustrations and condensed descriptions that summarize the current state of key thematic areas including the plastic life cycle, plastic additives, sources of microplastics, human health impacts, economic costs, as well as pros and cons of biodegradable plastics. The section on plastic additives contains an infographic illustrating the presence of hazardous chemicals in plastics based on a [2018 study](#) carried out by the *Food Packaging Forum (FPF reported)*.

UNEP's second report, “From Pollution to Solution,” provides a global assessment of marine litter and plastic pollution to present the impacts on the health of ecosystems, wildlife, and humans. The assessment concludes that there is a “need for urgent, global action” and that “while we have the know-how, we need the political will and urgent action to tackle this mounting crisis.” The report provides a detailed review of environmental, health, economic, and social impacts and risks, as well as an overview of sources and pathways of plastic pollution, monitoring methods and programs, and a set of challenges, responses, innovations, and opportunities to address the problem.

In a recent [book chapter](#), Martin Wagner, professor of biology at the *Norwegian University of Science and Technology (NTNU)*, discusses the importance of developing a conceptual framework to better organize and select from the diverse problem formulations and potential solutions that are promoted by different actors to address global plastic pollution. He

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argues that deciding on which solutions are most desirable is not a purely rational choice, but the considerations are instead “inherently linked to value judgments and worldviews that must, therefore, be part of an open and inclusive debate to facilitate solving the wicked problem of plastic pollution.” The chapter is part of a larger open access [book](#) published by *Springer Nature* focusing on microplastics in the environment.

[Read More](#)

Food Packaging Forum, 25 October 2021

<https://www.foodpackagingforum.org/news/unep-reports-assess-impacts-of-global-plastic-pollution-potential-solutions>

The burning question: How can we meet the WHO's guidelines on particulate matter?

2021-10-21

The government is resisting peers' attempts to amend the Environment Bill to set air quality targets in line with World Health Organization (WHO) guidelines. But why, and what policy options would ministers have to consider in order to meet the body's recommendations? Gareth Simkins investigates

Reducing air pollution – and with it the damage to health that it entails – is a laudable goal in anyone's books.

Hence the recent clamour in the House of Lords to slash legal limits on fine particulates (PM_{2.5}) during its third reading of the Environment Bill. On 6 September, it passed an amendment to set a limit of 10 micrograms per cubic metre as an annual average for PM_{2.5}, to be attained by 2030. The figure reflects guidelines set by the World Health Organization (WHO) in 2005.

PM_{2.5} is the fraction of fine particulates that can penetrate deepest into the lungs and even through the bloodstream and into the brain. Scientific studies have long highlighted its baleful effects on human health, from [diabetes and cardiovascular disease to kidney failure, lung cancer and glaucoma](#). The UK's current legal limit for it, again as an annual average, is a comparatively generous 25µg/m³.

The pollutant is “recognised by the government to be the single largest environmental risk to health in the UK”, said Labour peer Sue Hayman when first proposing her amendment in June. She added that putting the target on the face of the bill, rather than setting a weaker one later

Reducing air pollution – and with it the damage to health that it entails – is a laudable goal in anyone's books.

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via regulations, would answer the demands of the coroner in the case of young Ella Adoo-Kissi-Debrah, who was killed by dirty air.

The government has long resisted simply adopting the WHO's recommendation, though it has pledged to take it "into consideration". The amendment may well be dumped when the Commons finalises the bill.

[Read More](#)

ENDS Report, 21 October 2021

<https://www.endsreport.com/article/1730321/burning-question-meet-whos-guidelines-particulate-matter>

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REACH Update

NOV. 05, 2021

UK REACH Update: Imminent deadlines and challenges

2021-10-20

While it is nearly a year into the post-Brexit chemicals regulatory regime, the infrastructure to accommodate UK REACH registrations is not yet running smoothly and as a result importers and distributors of chemical substances are struggling to fulfil their obligations in time. For those companies that have not yet completed their registrations or notifications – and even for those companies that believe the necessary steps have been accomplished – updated functionality in the "Comply with UK REACH IT" platform and other developments make this an appropriate time to review their obligations for compliance purposes. Importers and distributors of chemicals from the EU into the UK must act now, as they have only a few days left in order to benefit from available transitional arrangements.

IN DEPTH

Deadline for Submitting DUIN Registrations Is 27 October 2021

Prior to Brexit, companies based in the UK that sourced chemical substances from EU suppliers above one tonne per year were considered as downstream users and were not obliged to register. Under UK REACH, such UK entities are treated as importers. In order to be able to continue supplying the substances from the EU without having to register them until 27 October 2023, 2025 or 2027 (depending on the tonnage band and/or hazard profile of the substance), UK importers have to submit a Downstream User Import Notification (DUIN) to the UK Health and Safety Executive (HSE) by 27 October 2021.

The process is straightforward; only the following information needs to be emailed to UK HSE:

- DUIN number, obtained by indicating on UK REACH IT that the company is an existing downstream user;
- Legal entity name; and
- Information on the substance(s) imported from the EU (i.e., substance name, CAS or EC number).

[Read More](#)

JDSupra, 20 October 2021

<https://www.jdsupra.com/legalnews/uk-reach-update-imminent-deadlines-and-5204402/>

Importers and distributors of chemicals from the EU into the UK must act now, as they have only a few days left in order to benefit from available transitional arrangements.

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REACH Update

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UK REACH Testing Proposal 005

2021-10-22

Overview

Substance name: (E)-N-{6-[(E)-{2-[2-(heptan-3-yl)-1,3-oxazolidin-3-yl]ethoxy}(hydroxy)methylidene)amino]hexyl}{2-[2-(heptan-3-yl)-1,3-oxazolidin-3-yl]ethoxy}carboximidic acid

CAS Number: 140921-24-0

EC Number: 925-259-5

The hazard endpoints for which vertebrate testing was proposed

Repeated Dose 90-Day Oral Toxicity Study in Rodents (OECD 408)

Pre-natal Developmental Toxicity Study in Rodents (OECD 414)

Long-Term Toxicity to Fish (ELS) (OECD 210)

Parties concerned are invited to provide scientifically valid information and studies that address the relevant substance and hazard endpoint(s) open for consultation.

The consultation will last for 45 days.

Consultations close at 23:59 London time (BST)

[Read More](#)

UK HSE, 22 October 2021

<https://consultations.hse.gov.uk/crd-reach/testing-proposal-005/>

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Janet's Corner

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My fault

2021-11-05



<https://parade.com/1193513/marynliles/science-jokes/>

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Hazard Alert

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Bis(2-chloroethyl)

2021-11-05

Bis(2-chloroethyl) ether (also known as bis dichloroethyl ether), molecular formula $C_4H_8Cl_2O$, is a colourless, nonflammable liquid with a strong unpleasant odour. It dissolves easily in water, and some of it will slowly evaporate to the air. It does not occur naturally. [1,2]

USES [3]

- Bis(2-chloroethyl) ether is primarily used as a chemical intermediate for the manufacture of pesticides.
- A small amount of bis(2-chloroethyl) ether is used as a solvent.
- In the past, bis(2-chloroethyl) ether was used as a solvent for fats, waxes, greases, and esters.
- It has also been used as a constituent of paints and varnishes, as a cleaning fluid for textiles, and in the purification of oils and gasoline.

IN THE ENVIRONMENT [2]

- Bis(2-chloroethyl) ether released to air can be broken down by reactions with other chemicals and sunlight or can be removed by rain.
- In water, it can be broken down by bacteria.
- When released to soil, some will filter through the soil to groundwater, some will be broken down by bacteria, and some will evaporate to the air.
- Bis(2-chloroethyl) ether does not build up in the food chain.

SOURCES & ROUTES OF EXPOSURE

Sources of Exposure [2]

- You are most likely to be exposed to bis(2-chloroethyl) ether if you work in a factory where it is made or used.
- People who live near a waste site or industrial facility containing bis(2-chloroethyl) ether may be exposed to it in the air they breathe or by touching contaminated soil.
- You could be exposed if you drank water that was contaminated with bis(2-chloroethyl) ether.

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Routes of Exposure [4]

Bis(2-chloroethyl) ether can affect the body if it is inhaled, comes in contact with the eyes or skin, or swallowed. It may enter the body through the skin.

HEALTH EFFECTS [3]

Acute Effects

- Acute inhalation exposure to bis(2-chloroethyl) ether in humans results in extreme irritation of the respiratory tract and skin.
- Animal studies have reported respiratory effects such as irritation of the nose and eyes; congestion, oedema, and haemorrhage of the lung; congestion of the brain, liver, and kidneys; and central nervous system (CNS) effects from inhalation exposure to bis(2-chloroethyl) ether.
- Acute animal tests in rats and mice have shown bis(2-chloroethyl) ether to have high acute toxicity from inhalation and oral exposure and extreme acute toxicity from dermal exposure.

Chronic Effects

- No information is available on the chronic (long-term) effects of bis(2-chloroethyl) ether in humans.
- Animal studies have reported decreased body weights in rats exposed to bis(2-chloroethyl) ether by inhalation and oral exposure.
- EPA has not established a Reference Concentration (RfC) or a Reference Dose (RfD) for bis(2-chloroethyl) ether.
- ATSDR has calculated an intermediate inhalation minimal risk level (MRL) of 0.1 milligrams per cubic meter (mg/m^3) (0.02 parts per million [ppm]) based on decreased body weights in rats.

Reproductive/Developmental Effects

- No information is available on the developmental or reproductive effects of bis(2-chloroethyl) ether in humans.
- In one animal study, no effects were observed on the reproductive tissues of the animals, but no tests on reproductive function were performed.

Cancer Risk

- No information is available on the carcinogenic effects of bis(2-chloroethyl) ether in humans.

Bis(2-chloroethyl) ether (also known as bis dichloroethyl ether), molecular formula $C_4H_8Cl_2O$, is a colourless, non-flammable liquid with a strong unpleasant odour.

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- Animal studies have reported an increased incidence of liver tumours in mice exposed to bis(2-chloroethyl) ether via oral exposure.
- EPA has classified bis(2-chloroethyl) ether as a Group B2, probable human carcinogen.

SAFETY [5]

First Aid Measures

- General advice: Consult a physician. Show this safety data sheet to the doctor in attendance.
- If inhaled: If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.
- In case of skin contact: Wash off with soap and plenty of water. Consult a physician.
- In case of eye contact: Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.
- If swallowed: Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

Fire Information

- Suitable extinguishing media: Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
- Special hazards arising from the substance or mixture: Carbon oxides, nitrogen oxides (NOx), Hydrogen chloride gas
- Firefighters should wear self contained breathing apparatus for fire fighting if necessary.

Exposure Controls & Personal Protection

Engineering Controls

- Handle in accordance with good industrial hygiene and safety practice.
- Wash hands before breaks and at the end of workday.

Personal Protective Equipment

The following personal protective equipment is recommended when handling bis(2-chloroethyl) ether:

- Eye/face protection: Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

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- Skin protection: Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands. The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.
- Body Protection: Impervious clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.
- Respiratory protection: For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator. For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

REGULATION [6]

United States

OSHA: The Occupational Safety & Health Administration has set the following Permissible Exposure Limit (PEL) for bis(2-chloroethyl) ether:

- General Industry: 15 ppm, 90 mg/m³ Ceiling (Skin)
- Construction Industry: 15 ppm, 90 mg/m³ Ceiling (Skin)

ACGIH: The American Conference of Governmental Industrial Hygienists has set a Threshold Limit Value (TLV) for bis(2-chloroethyl) ether of 5 ppm, 29 mg/m³TWA; 10 ppm, 58 mg/m³ STEL (Skin); Appendix A4 (Not Classifiable as a Human Carcinogen)

NIOSH: The National Institute for Occupational Safety and Health has set a Recommended Exposure Limit (REL) for bis(2-chloroethyl) ether of 5 ppm TWA (Skin), 10 ppm STEL (Skin), Potential Carcinogen

Australia [7]

Safe Work Australia: Safe Work Australia has set a time weighted average concentration of 5ppm or 29 mg/m³ for an 8 hour workday or 40 hour work week. A short term exposure limit (STEL) of 10ppm or 58 mg/m³ has also been set for bis(2-chloroethyl) ether.

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Australian artificial intelligence research to help astronaut grow plants in space

2021-11-03

Within the next five years, astronauts will be growing vegetables on the moon with technology developed by Australian scientists.

Key points:

- Astronauts will use artificial Intelligence developed by USQ researchers to grow vegetables on the moon
- NASA plans to use the moon as a base for astronauts exploring Mars and other planets
- Crops of leafy greens could be grown on the moon in the next five years

As NASA plans for human exploration of the Earth's moon by 2024, the ability to grow edible plants will be vital for the next steps in space exploration.

In the lead-up to the new era in space, University of Southern Queensland (USQ) scientists are developing artificial intelligence (AI) for astronauts to use on missions from the moon to Mars to grow their own fresh food.

Their mission is to develop agricultural tech software that will use sensors to detect early stress in plants being grown onboard space flights.

"(We're) taking technologies that we've developed ourselves in broadacre cropping systems, using machine vision to look at the crop, determine how the crop is performing and provide that feedback to an astronaut so it just makes it simple for them to manage," USQ's Professor Craig Baillie said.

Robot gardeners on the moon

NASA plans to set up a station on the moon as a home base for astronauts who will travel onto other planets.

Growing vegetables on the moon is seen as the best option to feed astronauts, as other technologies, like 3D printing of food, are not yet viable.

USQ engineer Cheryl McCarthy said programming the technology for the new environment was vital.

As NASA plans for human exploration of the Earth's moon by 2024, the ability to grow edible plants will be vital for the next steps in space exploration.

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“We’ve seen images of plants in space already that NASA has collected,” Dr McCarthy said.

“They still look like plants, and they still curl up and die so we need space environment signals that we can program the camera to detect the problems and fix them.”

The project includes the establishment of a larger ground-based laboratory in Toowoomba in parallel with the launch-ready system from NASA.

Team member and agronomist Jacob Humpal’s unusual passions as a child — plants and space — have now combined as part of his “dream” job.

“We’ll see if we can do it as well as Matt Damon,” Dr Humpal said, referring to the film *The Martian* in which Damon’s character tries to survive on Mars.

It is hoped the system will eventually evolve into artificial intelligence, an AI gardener on the moon.

“We want to automate as much as we can to help the astronauts so they can do a better job and what things they need to be doing that we can’t automate,” Dr Humpal said.

“The first stage is to have a screen that will tell you there is something going wrong and then you can correct that and later on down the line there is full automation where the machine will take care of the problem for you.”

The robot gardener will never look like a human though, at least not in the foreseeable future.

“It’s very difficult to program a robot with artificial intelligence to behave like a human and to move like a human so it’s much more like a series of beams or an arm,” Dr Humpal said.

The “early plant stress detection using machine vision for food safety in space” project will run for 12 months.

“We are hoping it will go to the moon within the next five years, but it will line up with NASA’s timelines and availability of launch craft,” Dr Humpal said.

abc.net.au, 3 November 2021

<https://www.abc.net.au>

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This luxurious fabric breaks down in the ocean without leaving a trace

2021-11-02

Look up images of ocean pollution and you’ll find islands of plastic items like cups, plastic bags, and other single use items. But microfiber from our clothing is also accumulating throughout the environment, and especially in our oceans and freshwater. According to one 2016 report, the fibers are not only ending up in our water supply—they are found in fish and other marine life too. A 2021 study found microfibers in the stomach of a deep sea fish that lives in a remote part of the South Atlantic Ocean, highlighting just how bad the microfiber pollution is around the world.

More than 70 percent of textiles used in the U.S. ends up dumped in a landfill or burned instead of recycled. Threads from the washing machine or a landfill then eventually make their way to waterways.

Enter sustainable fabrics. One company in particular, Lenzing, an Austria-based sustainable fiber producer that developed TENCEL, which are fibers that biodegrade rapidly in comparison with other regularly used fibers like polyester, creates fiber from raw material from wood. The plant base makes the fabric compostable, and materials are from a sustainably managed forest.

“We take wood from sustainable forestry and use a highly efficient system of processing all raw materials to produce fibers that are able to return to the ecosystem at the end of their life cycle,” said Robert van de Kerkhof, a member of the managing board at Lenzing Group via a press release. “The textile and non woven industries have to change. Our goal is to raise widespread awareness of major challenges such as plastic pollution.”

The relatively easy rate of breakdown could be crucial for ocean waste if more manufacturers lean on using biodegradable materials instead of synthetic fabrics that create microfibers. Researchers with the University of California’s Scripps Institution of Oceanography in San Diego tested the fibers and published a study in October highlighting how the wood-based material was able to biodegrade quickly in the ocean.

The scientists placed clothing made from synthetic material, like polyester in seawater for more than 200 days. Over the course of the soaking period, scientists did not observe any biofilm or biodegradation—the polyester clothes slowly broke down into plastic microfibers in the water.

More than 70 percent of textiles used in the U.S. ends up dumped in a landfill or burned instead of recycled

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“Plastics then undergo processes of fragmentation or deconstruction into smaller pieces... “[These materials] may take anywhere from decades to centuries for most types of plastic [to breakdown,” the study’s authors wrote.

However, clothing made from Lenzing’s TENCEL fibers were placed in seawater for only 21 days and showed signs of breaking down in the water including a biofilm around the material as it began to degrade.

This TENCEL clothing did not create the same microfibers when broken down— the researchers predicted that it would break down entirely in the water within just a few months.

The researchers pointed out that though using recycled plastic to make new clothing is a short term solution to plastic pollution, they worried that the constant introduction of plastic into the country’s waterways would only contribute more to the plastic microfibers in the environment, polluting drinking water and clogging the digestive tracts of sea animals.

“Arguably,” the authors write, “the negative impacts of microfibers accumulating in the environment may outweigh the impact that the larger plastic item could have otherwise had.”

popsci.com, 2 November 2021

<https://www.popsci.com>

World leaders pledge to end deforestation by 2030

More than 100 world leaders have agreed to a commitment to halt and reverse deforestation by 2030, in the first major deal of the 2021 U.N. Climate Change Conference (COP26) in Glasgow, Scotland.

The commitment, called the Glasgow Leaders’ Declaration on Forest and Land Use encompasses 85% of the world’s forests and offers \$19.2 billion in public and private funding to end both the legal and illegal destruction of forestland.

Leaders such as President Joe Biden, China’s Xi Jinping and Brazil’s Jair Bolsonaro have signed on to the deal. But the signatories have not yet determined how the commitment will be enforced, leaving scientists to warn that previous legally nonbinding deforestation deals — such as the 2014 New York Declaration on Forests, which pledged to halve

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deforestation by 2020 and end it by 2030 — failed to meet their objectives.PLAY SOUND

“It is good news to have a political commitment to end deforestation from so many countries and significant funding to move forward on that journey,” Simon Lewis, a professor of global change science at University College London, told the BBC. But he added that the world “has been here before” with the 2014 declaration, “which failed to slow deforestation at all.”

Jo Blackman, head of forests policy and advocacy at environmental human rights NGO Global Witness, said that while the pledge’s list of signatories is “impressive,” it risks reiterating past failed commitments if it “lacked teeth” in the form of legal commitments.

In addition to being crucial ecosystems, forests absorb and store carbon dioxide — which makes up around 80% of the greenhouse gases that drive climate change. Deforestation and land clearing account for 23% of global human-caused greenhouse gas emissions, according to a 2019 Intergovernmental Panel on Climate Change (IPCC) report.

The main drivers of land clearing are pasture for cattle (41%), commercial cropland to grow palm oil and soy (18%) and logging for paper and wood (13%), according to a 2019 study published in the journal Global Environmental Change.

Satellite data compiled by Global Forest Watch shows that one-third of the tropical deforestation that occurred in 2019 happened in Brazil. In fact, Brazil and Indonesia accounted for 52% of the 20,850 square miles (54,000 square kilometers) of lost forestland globally.

At the COP26 news conference, Bolsonaro said his government was committed to “eliminating illegal deforestation by 2030.”

In fact, many of the Bolsonaro regime’s actions have actually made it easier to seize, cut and clear rainforest via legal means, according to Human Rights Watch. And the Amazon is already on the brink. A July 2021 study showed that the Amazon has switched from producing more carbon than it absorbs, Live Science previously reported. Another study, published in October 2020, showed that as much as 40% of the Amazon rainforest could be at a tipping point where it could transform into savanna.

Although there may be challenges ahead, reforestation successes aren’t unprecedented and can be achieved. Despite the losses to precious tropical rainforest, one study using NASA satellites shows that in recent

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decades the world has become a visibly greener place. This is due, in large part, to efforts by China and India, which account for one-third of Earth's greening over the past 20 years; 42% of China's greening is made up of the planting of new forests and expanding old ones through programs that aim to mitigate air pollution, land degradation and climate change.

Of the pledge's new funding, \$1.7 billion will be used to support Indigenous communities in protecting rainforests by securing their rights to land. According to Global Witness, of the record 227 people killed while protecting ecosystems in 2020, one-third belonged to indigenous communities.

Originally published on Live Science.

[livescience.com](https://www.livescience.com), 3 November 2021

<https://www.livescience.com>

Scientists turn bioplastic into fertilizer

2021-10-29

Single-use plastics are a major environmental problem, polluting everything from the Mariana Trench to Mount Everest.

Because only 14 percent of plastics are actually recycled, many experts and advocates argue that the solution to the problem is to create a circular system whereby plastics are reused instead of discarded. Towards this end, a Tokyo-based research team has developed a way to convert bio-based plastics into fertilizer. But they say their findings have even broader implications for plastic reuse.

"We are convinced that our work represents a milestone toward developing sustainable and recyclable polymer materials in the near future," study co-author and Tokyo Institute of Technology assistant professor Daisuke Aoki said in a press release. "The era of 'bread from plastics' is just around the corner."

The research, published in Green Chemistry Thursday, focused on the bio-based plastic poly(isosorbide carbonate) (PIC).

Bio-based plastics are plastics made from biomass that have been proposed as a more sustainable alternative to petroleum-based plastics. PIC in particular is made from a monomer called isosorbide (ISB), a non-toxic glucose byproduct. ISB can be turned into fertilizer through a process called ammonolysis: Ammonia is used to separate the carbon connecting

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the ISB monomers. This creates urea, which is a nitrogen-rich substance that makes a popular fertilizer.

While scientists have long been aware of ammonolysis, the researchers sought to complete the reaction using as little energy and as few organic solvents as possible. First, they tried the reaction in 30-degree-Celsius water at atmospheric pressure. They were able to create urea, but the reaction was not complete within 24 hours and the PIC had not fully degraded. However, they found that increasing the water temperature to 90 degrees Celsius led to a complete reaction within six hours.

"The reaction occurs without any catalyst, demonstrating that the ammonolysis of PIC can be easily performed using aqueous ammonia and heating," Aoki said in the press release. "Thus, this procedure is operationally simple and environmentally friendly from the viewpoint of chemical recycling."

The Tokyo-based team is not the first to transform plastics into fertilizer. Startup Neptune Plastic developed a plastic from food-grade material that could be composted in a home garden, as Forbes reported at the time.

However, there is some debate as to whether or not bio-based plastics are really an environmentally friendly solution to the plastic pollution crisis. For one thing, they do not always biodegrade as quickly as advertised. A UN report concluded that they broke down too slowly in the ocean to be a meaningful alternative.

Circular solutions like the one proposed by Aoki's team would resolve this problem, of course. However, there is still a concern that growing biomass for bio-based plastics could contribute to the climate and biodiversity crises by taking up valuable land area that could be used for carbon storage or habitat.

"To satisfy the land requirement to replace plastics used for packaging globally, 61 million ha [hectares] would be needed for planting bio-based plastic feedstock, an area larger than France," the authors of a recent study on climate change and plastic pollution wrote. ~secowatch.com, 29 October 2021

<https://www.ecotwatch.com>

But some countries are unwilling to peg their emissions plans to the tougher goal, as it would require more urgent efforts.

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Climate experts warn world leaders 1.5C is 'real science,' not just talking point

2021-10-30

The 1.5C temperature limit to be discussed by world leaders at critical meetings this weekend is a vital physical threshold for the planet's climate, and not an arbitrary political construct that can be haggled over, leading climate scientists have warned.

World leaders are meeting in Rome and Glasgow over the next four days to thrash out a common approach aimed at holding global temperature rises to 1.5C above pre-industrial levels, the lower of two limits set out in the 2015 Paris climate agreement.

But some countries are unwilling to peg their emissions plans to the tougher goal, as it would require more urgent efforts. They prefer to consider long-term goals such as net zero by 2050.

Johan Rockström, the director of the Potsdam Institute for Climate Impact Research and one of the world's foremost climate scientists, warned that the 1.5C target was not like other political negotiations, which can be haggled over or compromised on.

"A rise of 1.5C is not an arbitrary number, it is not a political number. It is a planetary boundary," he told the Guardian in an interview. "Every fraction of a degree more is dangerous."

Allowing temperatures to rise by more than 1.5C would vastly increase the risk of irreversible changes to the climate, he said. For instance, it would raise the risk of the Arctic losing its summer ice, with dire knock-on effects on the rest of the climate as the loss of reflective ice increases the amount of heat the water absorbs, in a feedback loop that could rapidly raise temperatures further.

The Greenland ice sheet, the melting of which would raise sea level rises, could also be tipped into a state of irreversible decline beyond 1.5C.

A rise of more than 1.5C would also threaten changes to the Gulf Stream, which could also become irreversible. It could result in catastrophe for biodiversity hotspots, damage agriculture across swathes of the globe, and could inundate small islands and low-lying coastal areas.

"This is real science – it is a real number. Now we can say that with a high degree of confidence," he said, as 1.5C indicated a physical limit to the warming the planet can safely absorb.

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Rockström added: "[Staying within] 1.5C is achievable. It is absolutely what we should be going for."

The leaders of the G20 group of the world's biggest economies – developed and developing – are meeting on Saturday in Rome. They will fly to Glasgow for Monday morning, where they will be joined by more than 100 leaders from the rest of the world for the UN Cop26 climate summit.

The UK, as host of Cop26, has set the aim of "keeping 1.5C alive", but some countries – including China, Saudi Arabia and Russia – have been reluctant to agree to focus on the 1.5C limit, preferring to point out that the Paris agreement states the world must hold temperatures "well below" 2C while "pursuing efforts" to stay within 1.5C.

However, scientific research since the Paris agreement was signed has added to a compelling body of global science showing that if temperatures are allowed to rise by more than 1.5C, the consequences will be severely damaging and many are likely to be irreversible.

Other leading climate scientists echoed Rockström's warnings. Mark Maslin, a professor of Earth systems science at University College London, said: "The report by the Intergovernmental Panel on Climate Change (IPCC) published in 2018 made the science very clear: there are significant climate impacts all round the world even if we limit warming to 1.5C.

"The report also showed there were significant increases to impacts and damages if we overshoot this target ... These results were fully supported by the very latest 2021 IPCC science report [published in August]. This is the science and these agreed climate targets set by the Paris agreement are non-negotiable and have been agreed already by all 197 countries of the UN."

Joeri Rogelj, the director of research at the Grantham institute, Imperial College London, said: "Science tells us that climate change risks increase rapidly between 1.5C and 2C of warming. Looking at the last years, during which we experienced some of the impacts of a 1.2C warmer world [such as heatwaves, flooding and extreme weather] – one would be hard pressed to call this safe."

[theguardian.com](https://www.theguardian.com), 30 October 2021

<https://www.theguardian.com>

Despite the hair-raising struggle, disturbing the snakes' canoodling was absolutely the right call.

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Two extremely venomous snakes found mating in home drainpipe, yanked out by tails

2021-11-02

Some of the world's deadliest snakes were caught in the act of mating in a home's drainpipe and had to be yanked out by their tails, according to news reports.

Two Eastern brown snakes (*Pseudonaja textilis*), which are native to Australia and New Guinea, had crawled into a drainpipe at a home in Nambour, Queensland, in Australia and were only halfway into their mating session when snake catchers interrupted their tryst.

The interruption threw the male of the pair into a venomous hissy fit, and the deadly snake was close to landing multiple bites on its captor before both snakes were bundled away safely in cloth bags. The nail-biting scene was captured on video and can be seen on the snake-catching company's Facebook page.

"When we arrived, the snakes had their heads in the pipe so I was able to sneak up on them. I grabbed them both at the same time however one slipped out when I tried to pull them out of the pipe," Stuart McKenzie, owner of Sunshine Coast Snake Catchers 24/7 and captor of the two snakes, wrote under the video post. "Thankfully in the end I was able to get them both bagged up with the help of [co-worker] Olivia."

Despite the hair-raising struggle, disturbing the snakes' canoodling was absolutely the right call. Eastern brown snakes are the second most venomous snake in the world; these fast-moving, aggressive and irascible reptiles kill more people every year in Australia than any other snake, according to the Australian Museum. The snakes, which are the second most venomous snakes in the world, after the inland taipan, can reproduce rapidly in populated areas and easily enter into homes through small gaps and crevices.

In fact, the serpents only need to inject 0.00014 ounces (4 milligrams) of venom into a victim, human or otherwise, before the potent mixture of neurotoxins, cardiotoxins and procoagulants begins a process of increasing paralysis, cardiac arrest and uncontrollable bleeding. In some cases, a person will die of the snake's bite after venom causes bleeding in the brain.

While these snakes are usually an "alert and nervous" species, according to the Australian Museum, they will "strike with little hesitation" if threatened

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or surprised, often curling up into a tight s-shape before lunging at their attacker.

October is breeding season for the snakes, so McKenzie and other snake catchers have been seeing an increase in snake activity as the roaming reptiles search for mates. In the video, the snake catcher appears nervous, despite his thick, padded clothing and expertise. "You just disturbed him from a nice little mating session, I'd be pissed off too," Sunshine Coast Snake Catchers 24/7 McKenzie's co-worker Olivia, remarked in the video.

Originally published on Live Science.

[livescience.com](https://www.livescience.com), 2 November 2021

<https://www.livescience.com>

Gene-edited stem cells help geckos regrow more perfect tails

2021-11-01

Regenerating body parts is never easy. For instance, some lizards can grow back their tails, but these new appendages are pale imitations of the original. Now, genetically modified stem cells are helping geckos grow back better tails.

Tweaking and implanting embryonic stem cells on the tail stumps of mourning geckos (*Lepidodactylus lugubris*) allowed the reptiles to grow tails that are more like the original than ever before, researchers report October 14 in *Nature Communications*. These findings are a stepping-stone to developing regenerative therapies in humans that may one day treat hard-to-heal wounds.

A gecko's tail is an extension of its spine — with the vertebrae to prove it. Regenerated tails, however, are simpler affairs. "It's just a bunch of concentric tubes of fat, muscle and skin," says Thomas Lozito, a biologist at the University of Southern California in Los Angeles.

That's because stem cells in adult geckos produce a molecular signal that encourages the formation of cartilage in new tails, but not bone or nervous tissues (SN: 8/17/18). Lozito and his colleagues used embryonic stem cells, which can develop into a wider range of tissues than adult stem cells, modified them to ignore this signal and then implanted them on the tail stumps of geckos that had their tails surgically removed. The tails that grew from these modified stem cells had bonelike grooves in the cartilage and generated new neural tissue at the top of the tail.

Now, genetically modified stem cells are helping geckos grow back better tails.

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These modified tails still lack a spinal cord, making them a far cry from the original. "We fixed one problem, but there are still many imperfections," Lozito says. "We're still on the hunt for the perfect tail."

sciencemews.org, 1 November 2021

<https://www.sciencenews.org>

Andrew Ahern: We're not in a climate crisis. We're in an ecological emergency.

2021-11-01

During the beginning of October, nearly every country in the world, absent the United States, gathered to discuss and enact plans to confront our biodiversity crisis.

Unfortunately, this global gathering, called the Conference of the Parties on Biological Diversity (COP 15), did not gain the media or popular attention it deserves. In fact, our biodiversity crisis has largely been ignored in general.

With the biodiversity COP 15 concluding, and the climate change Conference of the Parties (COP 26) scheduled for the end of October, it is a good time to remind ourselves that we are not in just a climate crisis. We are in an ecological emergency.

However much we are moving too slow or even headed in the wrong direction on climate, given that emissions are set to rise over the coming years, we are headed in an even worse direction on biodiversity.

As it stands, between one-third and half of all species on earth are in danger of extinction by the end of the century. Plants and animals are disappearing at about 1,000 times the background rate — the rate extinctions were occurring before the Industrial Revolution (1830). That is about 100 species a year. Many species not in direct danger of extinction are thinning out as well.

Of the nine "Planetary Boundaries," the essential components of the Earth system that scientists tell us we must not transgress in order to preserve a "safe operating space for humanity," biodiversity loss is over the "safe" threshold and more than any other boundary, including climate. The circumstances are looking so bleak for biodiversity that some have prompted us to think that we are entering into a sixth mass extinction event.

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Biodiversity is not just some abstract flowery nature that upper-middle-class people can and should care about. Humans are a part of nature and depend on other species and ecosystems to provide us a safe and healthy environment. In order to have food from farms, pollinators like insects and birds are essential for helping grow that food. Biodiversity helps control pests and parasites that may otherwise eat our crops, as well.

According to a report released this year by the world's largest reinsurance company, Swiss RE, 55% of the globe's GDP depends on high-functioning biodiverse ecosystems. Our economy is functionally the main interaction we have with the globe's ecology, and therefore highly dependent on it.

More and more evidence points to those who are surrounded by and have access to biodiverse landscapes are happier, healthier and less stressed. Biodiversity and access to nature are environmental justice issues as much as anything else, impacting air quality, exposure to heat, and resilience in the face of extreme weather. Biodiversity is essential for creating pharmaceutical drugs as well. Health, economy and ecology are all linked.

What's causing our biodiversity crisis does not fly far from home. Scientists have observed at least five major drivers of biodiversity collapse. These include changes in land and sea use, and especially monocrop agriculture. The second is the rapacious need for resource extraction, driven by overproduction and overconsumption. The third is the climate crisis. Pollution, in the form of nitrogen, plastic, among other forms found in our air, water and soils, composes the fourth driver. Invasive species is the fifth.

Like climate change, biodiversity loss is being caused by "human activity." But not humans in the abstract. On a larger scale, it is the activity of capitalist corporations, aided by governments, who are obsessed with profits and growth. It is the richest individuals who live wasteful lifestyles, and the colonial countries who have offshored their pollution and destruction to poor and developing nations. "Humanity" as such is not to blame for our ecological problems. The way our economic and political systems are structured and who they are designed to benefit bear the brunt of the blame.

Fortunately, solutions abound. Reducing greenhouse gas pollution from fossil fuels will greatly contribute to reducing biodiversity collapse. In that, we can tackle both our climate and biodiversity crises.

Here in Vermont, farmers can play a major role in increasing the state's biodiversity. Moving away from monocrop models of agricultural production and toward regenerative forms like agroecology have shown

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to be majorly beneficial for biodiversity, without increasing costs or losing yields.

Institutionalizing forms of reuse, repair, recycle and thrift, rather than always having to buy “new,” will greatly reduce the amount of materials we need to extract from the earth. This could come in the form of policies such as banning planned obsolescence, right to repair, and setting resource use limits, to name a few.

We live on a different planet than the 18th, 19th or 20th century. It is time to wake up to this reality and act accordingly. We are still in the midst of a pandemic that has made us question our assumptions about the economy, health, labor, and our everyday lives.

This is the opportunity to act with pace and purpose. Trimming around the edges or deadlines decades away endanger my generation and future ones. It’s time to enact bold, comprehensive, and holistic change. Anything less is greenwashing and window dressing.

[vtdigger.org](https://www.vtdigger.org), 1 November 2021

<https://www.vtdigger.org>

Environmental groups petition EPA to rescind factory farms’ “free pass to pollute”

2021-10-28

A coalition of environmental and animal rights groups petitioned the federal Environmental Protection Agency (EPA) yesterday to abandon a “sweetheart” deal with factory farm owners—and start enforcing air pollution regulations.

The 24 organizations, which include the Center for Biological Diversity, Food & Water Watch, and the Southern Environmental Law Center, say in the petition that a 2005 deal signed by the EPA with owners of 13,900 animal feeding operations—so-called “factory farms” where animals are raised in confined settings instead of in pastures—has put many rural communities in a “purgatory of legalized air pollution.”

A recent study in the journal Proceedings of the National Academy of Sciences (PNAS) estimated that air pollution from U.S. meat production, including raising feed crops for livestock, kills 12,700 people a year. Animal manure gives off acrid-smelling gases like ammonia and hydrogen sulfide and releases volatile organic compounds, while livestock kicking up dust and farmers tilling fields release fine particles into the air.

“We urge the EPA to end this amnesty now and enforce clean air laws against [animal feeding operations] as it should have been doing this entire time.”

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“For nearly 20 years, the EPA has given the industry a free pass to pollute, with seemingly no end in sight to this immunity,” Emily Miller, an attorney with Food & Water Watch, told EHN. “We urge the EPA to end this amnesty now and enforce clean air laws against [animal feeding operations] as it should have been doing this entire time.”

As U.S. livestock and poultry farms started to consolidate and grow larger toward the end of the last century, issues around air pollution from operations came to a head in the early 2000s.

Rather than require that owners of factory farms apply for permits under the Clean Air Act, the EPA under the Bush Administration instead reached a deal with pork, egg, and other livestock industry representatives.

The agreement, signed by the owners of more than 90% of the largest animal feeding operations in the country, said that the agency would not enforce air pollution regulations provided that factory farm owners pay for a national livestock and poultry air pollution study, according to the petition. The EPA would then use that data to develop emissions models that would determine whether owners of specific farms needed to apply for Clean Air Act permits.

Although the agreement was supposed to end in 2010, the EPA has yet to finalize those models and start regulating air pollution from the thousands of feeding operations that signed onto the agreement. And even though additional farms can’t join the 2005 agreement, the EPA hasn’t been regulating newer farms either, said Miller.

In 2017, the EPA’s auditor, the Office of the Inspector General, called on the agency to move forward with regulating emissions from the roughly 18,000 large animal feeding operations in the U.S.—something the agency has yet to do.

Miller said the petitioners want the EPA to use a simpler method for farmers to estimate farm emissions, as it has done for other polluters. She noted that California, the only state that has its own program for regulating air pollution from factory farms, developed a system for estimating emissions from factory farms, and said there’s no reason the EPA can’t follow suit.

Exposure to fine particulate matter, ammonia, and other kinds of factory farm pollution has been linked to pneumonia, asthma, cardiovascular disease, nausea, and mental health issues, among other health concerns. Deaths from farming air pollution are concentrated in rural parts of

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California, North Carolina, Pennsylvania, and the Midwest, according to the PNAS study.

President Biden has said that he wants to make addressing “historical and current environmental injustices” a priority for his administration.

“If Biden is serious about those commitments, then immediate action on factory farm pollution is essential,” said Miller.

If the EPA does start regulating factory farm pollution, owners might be required to take measures like using scrubbers or biofilters to clean barn air or manure storage air.

A spokesperson from the EPA said the agency will review the petition.

[ehn.org](https://www.ehn.org), 28 October 2021

<https://www.ehn.org>

Australia looks like a climate laggard, as other countries ramp-up efforts

2021-11-03

There are calls from all directions for Australia to do more to cut its greenhouse gas emissions.

However, with a near-term commitment to cut emissions by just 26 per cent below 2005 levels by 2030, Australia’s ambition is considered insufficient by almost any measure.

Labor is calling for stronger 2030 targets, although the opposition won’t say what those targets should be until after the Glasgow conference.

Others have been clearer. The Business Council of Australia has backflipped on earlier calls to go slow on climate action and is now calling for a 46-per-cent cut by 2030.

Some in the government have called for stronger targets too. Liberal MP Dave Sharma, for example, suggested a 2035 target of at least 40 per cent, which pulls off the neat trick of implying that the government needs to exceed its 2030 target without explicitly repudiating it.

However, the government has insisted our target is fair, and that Australia will “meet and beat” it.

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The latest projections show the target isn’t even ambitious under its own spotlight: The government projects emissions to be cut by at least 30 per cent by 2030.

So let’s look at the targets. Are they fair? And will we beat them?

Abbott-era targets still at play

Back in 2015, Tony Abbott was still — just — prime minister, Australia announced the 2030 targets it would take to the historic COP21 meeting in Paris that year.

Here’s what our emissions looked like at the time.

Mr Abbott, and then Malcolm Turnbull, committed Australia to cut emissions by between 26 and 28 per cent below 2005 levels by 2030.

At the time, the government’s own Climate Change Authority blasted the targets as too weak, saying they should be between 45 and 65 per cent.

However, the targets were pretty similar to what the United States was offering at the time, only the US was saying it’d reach the same target five years earlier: by 2025.

Comparing the targets to other countries is tricky because they were all expressed with different start and end dates. But Australia’s target, at the time, was a bit weaker than the US, Japan or Canada’s, and a lot weaker than the European Union.

It’s also worth noting what the choice of 2005 as a baseline meant it was roughly when emissions peaked in Australia, making reductions relative to that year fairly easy.

Fast forward six years and the picture changed dramatically.

Australia’s target has remained steadfast, but much of the world has accelerated their ambition, leaving us looking every bit the laggard.

The US is going to reduce emissions by at least 50 per cent by 2030 compared to 2005. The EU is shooting for 55 per cent and Canada is aiming for 40 per cent.

Japan uses a different baseline but has committed to 46 per cent.

And the United Kingdom is the most ambitious of all the developed countries, aiming to cut emissions by more than 60 per cent below 2005 levels by 2030 — their target is 68 per cent below 1990 levels.

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However, looking further ahead, we have now committed to reducing emissions all the way to zero by 2050.

In light of that, every step we've taken towards a stronger 2030 target will make that final drop to zero considerably easier.

Are we actually reducing our emissions?

Looking simply at our total emissions, Australia has made significant reductions since 2005. We've cut out about a fifth of our total emissions.

But one single thing has done the vast bulk of that work, and that's obvious when we look at the emissions from each sector.

For a decade from about 2007, "land use change" is where we cut most of our emissions.

Land use change usually means clearing — or reforestation — land. Most clearing is done for agriculture, where trees are cleared to make pasture for cattle.

At the end of 2006, Queensland reined in clearing, and Australia's emissions subsequently plummeted.

That helped for a decade, but further gains from the land sector have been hard to achieve.

Since 2015, another change started to dominate: the transition to renewable energy.

Electricity generation is the biggest source of greenhouse gas emissions and, as renewables have been gaining ground, emissions there have been dropping slowly.

But that's pretty much where the good work ends and the problem for Australia's future emissions begins.

Emissions from fossil fuel use in other sectors — industry, transport and mining — have all been going up for years, with a temporary drop during the start of the pandemic.

So will we get where we need to?

Predicting the future is fraught.

Until this year, the government's official projections didn't suggest we would meet our 2030 targets, let alone get on a trajectory towards net zero emissions by 2050.

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But the government pointed out that, each year, the projections improve and the task to reach our targets mysteriously gets smaller.

And they weren't wrong. This chart shows successive projections. What's constantly underestimated is how much emissions will drop.

Now the government's latest projections show us beating the 2030 targets.

But, if that happens, the federal government can't take much credit for that.

Its central emissions reduction policy — the emissions reduction fund — pays polluters to reduce their emissions. It's bought about 73 million tonnes of carbon offsets. That's a tiny proportion of what was needed to get to our targets.

And federal agencies such as the Australian Renewable Energy Agency and the Clean Energy Finance Corporation exist despite attempts by this government to shut them.

Regardless of what has got us there — market inevitabilities, state government policies or federal interventions — a lot more is going to be needed to get to net zero by 2050.

For electricity — assuming carbon capture and storage keeps failing at scale — the solutions are clear: Eliminate all fossil fuels and rely entirely on renewable energy and storage.

For transport, it's similarly clear: Electrify everything.

Gas for industrial heat can mostly be replaced with electric heat pumps and green hydrogen.

However, methane leaks from coal and gas extraction is harder, as is agriculture and waste. There are solutions to stop cows and landfill belching out so much methane, but they only go so far.

That's where the "net" in "net zero emissions" comes in.

There will always be some things that produce greenhouse gases. For that reason, we'll need to do things like plant a lot of trees to remove those gases from the atmosphere.

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Can we do it? We'll soon find out.

abc.net.au, 3 November 2021

<https://www.abc.net.au>

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An asteroid barely missed Earth last week, and no one knew it was coming

2021-11-03

An asteroid about the size of a refrigerator shot past Earth last week, and astronomers didn't know the object existed until hours after it was gone.

It was a close call (from a cosmic perspective); the space rock's trajectory on Oct. 24 carried it over Antarctica within 1,800 miles (3,000 kilometers) of Earth — closer than some satellites — making it the third-closest asteroid to approach the planet without actually hitting it, CNET reported.

Scientists were unaware of the object, dubbed Asteroid 2021 UA1, because it approached Earth's daytime side from the direction of the sun, so the comparatively dim and small visitor went undetected until about 4 hours after passing by at its closest point, according to CNET.

PLAY SOUND

But with a diameter of just 6.6 feet (2 meters), UA1 was too small to pose a threat. Even if it had struck Earth, most of its rocky body would have burned away in the atmosphere before it could hit the ground, CNET reported.

Comets and asteroids that orbit within our cosmic neighborhood, approaching Earth within 1.3 astronomical units (120.9 million miles, or 194.5 million kilometers) are known as near-Earth objects (NEOs), according to NASA's Center for Near-Earth Object Studies (CNEOS). NASA uses telescopes on the ground and in space to find and monitor NEOs; to track their orbits and identify their size, shape and composition; and to pinpoint potentially hazardous objects, managing these efforts through the agency's Planetary Defense Coordination Office.

For an object to be considered dangerous, it has to measure at least 460 feet (140 m) in diameter, NASA says. UA1 may not have been big enough to threaten the planet, but what about bigger asteroids that might be headed our way? NASA is also investigating defensive technologies for protecting Earth from possible collisions with larger space rocks, through deflection.

The Double Asteroid Redirection Test (DART), scheduled to launch Nov. 24, will test a method for diverting asteroids by hitting them with high-speed remote-controlled spaceships, NASA representatives said in a statement. Scientists will send the DART spacecraft hurtling into the near-Earth binary asteroid Didymos, which is shaped like a spinning top and has two bodies;

But with a diameter of just 6.6 feet (2 meters), UA1 was too small to pose a threat.

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the bigger one measures about 2,600 feet (780 m) in diameter, and its smaller moonlet measures around 520 feet (160 m) in diameter.

Didymos came closest to Earth in 2003, skimming it at a distance of approximately 4.5 million miles (7.18 million km), but it typically circles the sun just outside Earth's orbital path, according to NASA. While Didymos doesn't threaten Earth, it's just about the right size to test if the collision can nudge a hazardous NEO enough to divert it from a collision course with Earth, according to the statement.

Still, to divert an asteroid, NASA would need to detect it before it hit Earth. That's why another mission, NEO Surveyor, is developing an infrared space telescope that could improve the chances of spying sneaky asteroids such as UA1 that approach from behind the sun, according to the University of Arizona's Lunar and Planetary Laboratory, which is collaborating with NASA on the project.

To date, NASA has identified approximately 27,000 NEOs, of which about 9,800 measure at least 459 feet (140 m) in diameter and 890 measure 0.6 mile (1 km) in diameter, according to the CNEOS.

While UA1 may have been a relative pip-squeak, other asteroids zooming by Earth on Nov. 2 are significantly bigger, according to NASA Jet Propulsion Laboratory's Asteroid Watch. Those five space rocks range in diameter from 56 feet (17 m), or about the length of a house, to an airplane-size 170 feet (52 m).

Luckily, none of these space rocks will come within 515,000 miles (829,000 km) of Earth, NASA says.

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[livescience.com](https://www.livescience.com), 3 November 2021

<https://www.livescience.com>

Germans and their beloved bike paths

2021-10-28

As a German-American born in Germany who later moved to the States for middle school, I have often found myself at the intersection between two cultures. One of those cultural intersections is biking.

Yes, by European standards, Germany is a car country. But for someone from a country like the US with little biking infrastructure, Germany has

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bike lanes "that seamlessly flow from the sidewalk to the road," as my American partner recently said to me.

My German family and friends, living in the capital, Berlin, or in that sleepy city on the Rhine, Bonn, regularly bike to work or social events. But I don't know anyone who does the same in the US.

According to a 2020 survey sponsored by the German Ministry of Traffic, 30% of Germans regularly bike to work. That number was only 0.5% in the United States, according to 2019 data provided by the American League of Cyclists.

This difference in approach, I think, boils down to a couple of things.

Bike lanes and Germans

Though not an exact science, I've noticed that many Germans seem to go to great lengths to defend their bike paths.

In the US, you'll regularly see pedestrians ignore traffic intersection signals such as "Don't Walk," or even witness people zig-zag across lanes on the highway. But bike paths, for their part, don't play a big role in many cities.

In Germany, on the other hand, bike paths often appear to be sacred territory.

Some years ago, my sister, only 8 at the time, was nearly run over by a bike in Berlin because she was cluelessly standing in the bike lane. The cyclist didn't bother to apologize and raced off, leaving the impression that he considered himself to be right and my sister wrong.

Cycling is taken so seriously in Germany that there are laws in place to regulate it, such as having to obey signals like traffic lights, or not being legally permitted to ride a bike while under the influence of drugs or alcohol.

The regulations go so far, for example, that a co-worker of mine was fined for not stopping at a stop sign while biking on her way to work in Bonn.

Sticking to the rules

Often, when I forget my German pedestrian etiquette, I find myself getting admonished for having some part of my body taking up space in the bike path.

According to a 2020 survey sponsored by the German Ministry of Traffic, 30% of Germans regularly bike to work.

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At times, I also feel the urge to go up to tourists or other non-Germans aimlessly walking on a bike path and let them know that they could very well get yelled at.

Few could relate to such anecdotes in the United States. Still, I like biking in Germany. If you are in the bike lane and actually biking, you know you're in a good place.

The importance of biking

There has been a marked biking boom of late, in Germany and Europe. The combination of the COVID-19 pandemic, pressing climate issues and new ways of using urban spaces have all increased the interest in the environmentally-friendly bicycle. Around a million more bikes were sold in Germany in 2020 than the year before, an increase of around 35%, according to the German Bicycle Association.

Although the United States has plenty of catching up to do with Germany when it comes to biking infrastructure and general biking culture, even Germany is falling short of its potential.

"The bicycle is quite popular throughout Europe right now because it provides answers to pressing problems of our time," the German Cyclist's Association (ADFC) told me. But there are big differences within Europe.

"Compared to the Netherlands and Denmark, Germany is still difficult terrain for cyclists. While our neighbors started fighting car traffic and making room for wide bike lanes as early as the 1970s, Germany has continued to pay homage to car traffic and marginalized cycling," said the ADFC.

The political climate

Both the US and Germany largely identify as car countries. Given the political sway that car manufacturers have, the car is still king of the road. But there is more pressure now than ever to find new modes of clean transportation.

To some extent, the US and German governments have recognized this and regard biking as one of the many parts of a solution to reduce emissions.

In the massive \$1 trillion (€853.4 billion) Infrastructure Bill on the verge of passing in the US, there are a handful of issues that address the need to improve biking culture in the country.

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One way the bill tackles the concerns of cyclists is by increasing transportation alternative funding by 60%, while making several policy changes that enable easier access to alternative transportation funding for local government.

"The Bipartisan Infrastructure Bill is good for people who bike and walk. Is it perfect? No. But it is a great step forward ...," the League of American Bicyclists said in a statement.

With a national election having just occurred in Germany, it remains to be seen what the new government will do in terms of climate protection and mobility policies.

Surely, improving biking infrastructure is a key to addressing transportation and mobility challenges and offering cleaner solutions.

Meanwhile, as the political gears slowly turn, the American in me just hopes that one day it will be the norm for people in countries like the US to enjoy a more positive biking culture and not be surprised when I tell them that I bike to work every day.

[dw.com](https://www.dw.com), 28 October 2021

<https://www.dw.com>

What makes a 'refugee'? It could be a life-or-death question in the climate crisis

2021-10-28

In late 2020, a succession of violent storms slammed into Central America during the worst Atlantic hurricane season on record. The effects were devastating. Flooding and mudslides caused billions of dollars' worth of damage, killed hundreds of people, and displaced more than half a million more. The storms were part of an ominous trend across the world. Just over a year earlier, two of the biggest cyclones ever recorded in the Southern Hemisphere hit Mozambique in what was one of the worst natural disasters suffered by Southern Africa in decades.

Climate change, scientists say, is likely playing a role in the growing frequency of mega storms like these, and there's reason to think that more are on the way. For people living in the path of those storms, that means danger, suffering, and pressure to move to safer areas. Some may look to cities further inland, and others may choose — or be forced — to migrate to other countries.

"We urgently need a just and humanitarian international framework to protect the climate refugees of today as well as those of tomorrow."

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An analysis by the Environmental Justice Foundation (EJF) says that the world isn't prepared for a rise in that kind of migration, with international agreements set up to protect refugees almost entirely failing to include people fleeing the impacts of climate change. As atmospheric carbon dioxide concentrations reach their highest levels ever, the group says that countries need to establish better systems to take care of people living at the frontier of the crisis sooner rather than later.

"As the planet continues to heat, the number of people displaced by climate impacts will continue to grow," said Isabella Shraiman, climate campaigner at the EJF. "We urgently need a just and humanitarian international framework to protect the climate refugees of today as well as those of tomorrow."

Last week, U.S. President Joe Biden's administration released its own long-awaited report on the future of climate-related migration, which it promised to prepare in an executive order signed not long after coming to office earlier this year. The report called for greater investment in aid initiatives meant to help low-income countries prepare for climate-related disasters, and said the U.S. government should create new lines of communication between federal agencies addressing climate migration.

But the report stopped short of recommending new legal protections for people fleeing environmental disasters, instead suggesting that responsibility for any expansion of refugee policy should be led by the U.S. Congress. Advocates say it was a missed opportunity for the Biden administration to take the lead on proposing a new framework itself.

"It's super comprehensive and does a good job covering a lot of the issues that are weedy and detailed and hard, but what it doesn't do is move onto the next phase and say, OK, we know all these challenges, but what are the implications for policy?" said Kayly Ober, climate displacement program manager at Refugees International, which convened an expert task force to present recommendations to the Biden administration last summer.

With climate-related disasters expected to increase dramatically in the coming decades, tens of millions of people will likely be forced to migrate for reasons as varied as drought, heat waves, resource-related conflict, and sea level rise. Not all will cross a border — according to the World Bank, as many as 143 million people are projected to migrate to another part of their home country because of climate change by 2050.

In addition to the human, cultural, and financial costs of migration at that scale, it could also become yet another stressor on the environment.

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Studies have shown that sprawling refugee camps can be harmful to biodiversity in the areas where they are established, and the movement of people from rural areas into cities often strains their capacity for waste management and creates more pollution.

To minimize the burden on countries that already struggle with limited resources — and ensure that displaced people are treated compassionately — the EJF says a new international agreement covering climate migration should be a top priority for global policymakers.

"We need a rights-based system for dignified solutions for people displaced both within and across borders," Shraiman said.

The politics of creating a new agreement would likely be fraught. Refugee and asylum policies have become a cultural flashpoint in the U.S., EU, and elsewhere in recent years, with elected officials riding anti-immigration sentiment into prominence and power. If the 1951 Refugee Convention were to be renegotiated in order to include people fleeing climate change, those officials could push for it to be narrowed rather than expanded. Any new international standards would also have to wrestle with thorny questions about how to determine whether climate change was the specific cause of someone's decision to migrate.

"It's unlikely that we're going to open the 1951 convention, or even in the U.S. change domestic law about the way we define refugee," Ober said. "And if we were to do so, that might end up watering down the framework rather than bolstering it."

Long-standing international law says that to be considered a refugee, a person has to be fleeing persecution on the basis of their "race, religion, nationality, membership of a particular social group or political opinion." Environmental catastrophes are not included in that framework, leaving people displaced by climate change largely ineligible for protection under the Refugee Convention.

Early last year, though, the U.N. Human Rights Committee issued a ruling in the case of a man seeking asylum in New Zealand on the basis of rising sea levels in his home country of Kiribati, an island nation in the Central Pacific. The committee didn't order New Zealand to accept his application, but it said deporting a person to a country where their right to life is threatened by climate-related conditions is illegal under international law. Advocates hope that the ruling is a sign that the world is shifting toward a new paradigm for climate refugees.

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“We can’t let climate change lead to people being trapped in misery, and we have to be real and wide-eyed about that, meaning that people may need to move to the EU or U.S., or wherever it is that they’re able to have a more secure and stable environment,” Ober said.

With a U.S. National Intelligence Estimate released last week saying that the world is currently on a trajectory for 2° Celsius (3.6° Fahrenheit) of warming by 2050, the world’s approach to climate-related migration could be a matter of life or death for millions of people.

“The climate crisis is already here,” Shraiman said, “and global heating is already forcing people to leave their homes.”

news.mongabay.com, 28 October 2021

<https://www.news.mongabay.com>

Pandemic lockdowns did virtually nothing to slow down the climate crisis: report

2021-10-25

Greenhouse gas levels reached a record high in 2020 despite much of the world spending at least part of the year under lockdown or working from home, a United Nations agency announced Monday.

Although fossil-fuel carbon dioxide emissions fell by 5.6 percent due to the pandemic-slowing economic activity, greenhouse gas accumulation was still higher than the 10-year average, according to the World Meteorological Organization’s (WMO) latest issue of its Greenhouse Gas Bulletin.

The current level of carbon dioxide concentration is 50 percent more than was in the air before the Industrial Revolution, and levels haven’t been this high in 3-5 million years, when global temperatures were higher by an average of 2-3 degrees Celsius. That’s long before humans existed.

Carbon dioxide, which absorbs and radiates heat, is the greenhouse gas that contributes most to the climate crisis. According to the U.N., around half of the carbon dioxide emitted by human activities today remains in the atmosphere, while the other half has been absorbed by oceans and land ecosystems. Considering the speed at which greenhouse gases are now accumulating in the atmosphere, the world is far from achieving the goals set by the Paris Agreement in 2015. President Trump announced the U.S. was formally withdrawing from the agreement in 2017, but the Biden administration reaffirmed the nation’s commitment in February.

The current level of carbon dioxide concentration is 50 percent more than was in the air before the Industrial Revolution[.]

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“At the current rate of increase in greenhouse gas concentrations, we will see a temperature increase by the end of this century far in excess of the Paris Agreement targets of 1.5 to 2 C above preindustrial levels,” said WMO Secretary-General Petteri Taalas. “We are way off track.”

This information comes as nations prepare for the COP26 climate summit in Glasgow next week, and as Democrats in Congress continue to negotiate with the White House and moderates in their party to pass a budget reconciliation bill that includes measures that would strengthen the social safety net and mitigate the climate crisis. At the summit, countries will discuss actions that can help reach the goal of ending greenhouse gas emissions by 2050, in the hopes of staving off a climate catastrophe.

“It is hoped COP26 will see a dramatic increase in commitments,” said Taalas. “We need to transform our commitment into action that will have an impact on GHGs. We need to revisit our industrial, energy and transport systems and whole way of life — the needed changes are economically affordable and technically possible. There is no time to lose.”

rollingstone.com, 25 October 2021

<https://www.rollingstone.com>

Girthy ‘penis plant’ blooms for the first time, sparking excitement at Dutch garden

2021-10-29

A plant that stands taller than a grown human, reeks of decomposing flesh and looks vaguely phallic recently bloomed in the Netherlands’ oldest botanical garden, to the delight of garden staff and visitors alike.

The *Amorphophallus decus-silvae*, a type of “penis plant,” bloomed for the first time last week after about six years of growth, according to a statement from Leiden University, which founded the garden, Hortus Botanicus Leiden, in 1590. Garden volunteer Rudmer Postma originally cultivated the towering plant from a leaf clipping and has diligently tended to it over the years, Dutch newspaper NRC reported. Part of the plant grows underground as a “tuber,” and another portion pokes up through the soil, Postma told NRC. In mid-September, the *A. decus-silvae* sprouted a bud for the first time, indicating that it might soon burst into bloom.

Over the past month, the bud grew to be about 1.6 feet (0.5 meter) tall, and its supporting stem is now 6.5 feet (2 m) long

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Over the past month, the bud grew to be about 1.6 feet (0.5 meter) tall, and its supporting stem is now 6.5 feet (2 m) long. And last week, the bud finally unfurled, exposing an erect structure standing proudly at its center, according to the Leiden University statement. This white, phallus-like structure, called the spadix, extended upward from a collar of ribbed, purple foliage, known as a spathe. It's the spadix that generates the penis plant's distinct odor, a pungent aroma reminiscent of rotting meat.

Hortus Botanicus Leiden volunteer Roos Kocken filmed a video of the *A. decus-silvae* shortly after it bloomed, noting that "it didn't smell very bad yet, but it got more intense in the afternoon." The garden set up a ladder next to the blooming plant so visitors could peer down into its open spathe and experience the spadix's scent at close range.

Like its relative the corpse flower (*Amorphophallus titanum*), in the wild, the blooming *A. decus-silvae* uses its stench to draw flies and other pollinating insects into its spathe. The plant then enters the next stage of its growth cycle, during which it starts pumping out pollen in large quantities. This pollen clings to any insects that flock to the stinky flower; after the bloom withers and the stench subsides, the pollen-coated insects buzz off to (ideally) pollinate a nearby *A. decus-silvae*.

Hortus Botanicus Leiden has just one *A. decus-silvae* plant, but the garden staff collected and stored the plant's pollen at minus 76 degrees Fahrenheit (minus 60 degrees Celsius), in order to use it to pollinate other specimens in the future and to share some with other gardens, greenhouse manager Rogier van Vugt told NRC.

Very few gardens keep an *A. decus-silvae* in their collections; in fact, the Hortus Botanicus Leiden's plant is only the third representative of the species to bloom in Europe, van Vugt said in an interview with the Dutch regional broadcaster Omroep West. In the wild, *A. decus-silvae* grows only in the hot, humid tropical forests of the Indonesian island of Java.

Hortus Botanicus Leiden houses several other plants in the *Amorphophallus* genus, whose name translates to "shapeless" or "misshapen penis," van Vugt told Omroep West. ("It's a bit of a stupid name," he added, noting that you need "a little imagination" to see the cigar-like spadix as a phallus.)

Incidentally, the species name *decus-silvae* translates to "glory of the forest" — a name still suggestive of genitalia but perhaps less blatant than the plant's genus name.

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The last time a penis plant bloomed in the garden was 1997, but it was a different species to the *A. decus-silvae*. The recently unfurled *A. decus-silvae* bloomed for two days, and it may be many years before the plant blooms again, according to the Leiden University statement.

"Blooming costs the underground tuber so much energy that it then has to save for a number of years," van Vugt told NRC. "It can take six or seven years before it is big enough to flower again."

"I'm quite proud," Postma told NRC of the plant's recent bloom. "It is special that we succeeded at all," given that the plant will only bloom under certain conditions, "and I am proud that the plant is doing so well."

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[livescience.com](https://www.livescience.com), 29 October 2021

<https://www.livescience.com>

We're losing our lawns. And that's ok.

2021-10-29

I was seven years old and hanging upside down—knobby knees slung over the trapeze bar, blond hair dragging through the grass—when the birds tried telling me something. A little wren swooped down low and fast; I startled and nearly fell. My sister squealed, and my mom called us in. For days it kept happening: whenever we went outside, birds flew straight for us. Eventually, we found a baby wren who had fallen from its nest into a patch of grass next to the monkey bars. The other birds had been trying to protect it from us. My sister and I, with the help of our mom, tried to save the tiny thing, crafting a little bed in a shoebox and feeding it water from an eyedropper. I wept when it died the next day. But then it was back to playtime.

Our saga with the wrens is one of many childhood memories I have of playing in backyards and front yards. We moved all over the country when I was a kid, but one thing we always had was a grass lawn where we spent most of our time. Our yards taught me that outside is way more fun than inside. A backyard was the destination of my first "camping trip"; it was the flat ground on which I learned to catch a lacrosse ball, hit a birdie, and throw a Frisbee; and it's where my friends and I spent hours running through the smack of the sprinkler, slip-sliding in the grass until the well ran dry.

In Portland, grass lawns were baked to burnt straw by early July.

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These days I live in a condo in Portland, Oregon. My partner and I plan to move to a house with outdoor space soon, where we will hopefully, someday, raise a child. When I think of a hypothetical yard, an expanse of green grass still comes to mind. But the narrative around grass lawns is changing—the connotations shifting and increasingly problematic. Over the summer, record-breaking heat waves made possible by climate change hit the Pacific Northwest. It was so hot in late June that asphalt buckled and hundreds of people died. In Portland, grass lawns were baked to burnt straw by early July. Some people kept watering, but one could sense an atmosphere of concern and even judgment aimed at our sprinkler-using neighbors: things have to change. In late summer, I saw a yard sign that read, “This lawn is maintained by rakes and brooms.” I realized that even the familiar hum of a gas-powered lawn mower now sounds insidious—instead of evoking memories of long summer days, it sounds like our inescapable reliance on fossil fuels. It sounds, too, like the toxic pesticides that so often follow. According to the Environmental Protection Agency, 59 million pounds of pesticides were used on lawns in America in 2012 (the most recent year this was calculated).

There are about 40 million acres of grass lawns in the United States, while about 500 square miles of turfgrass are planted across the United States each year. Plenty has been written about why that’s a problem: grass lawns require a lot of water to stay green; the maintenance makes them net-carbon emitters; and the monoculture nature of a grass lawn hurts biodiversity, failing to feed and house all kinds of creatures, including the critical pollinators we need to maintain healthy ecosystems.

It’s increasingly obvious that the American obsession with green grass just doesn’t make sense. Here in Portland, the Audubon Society has welcomed over 8,000 members to its Certified Backyard Habitat Program since that initiative was founded in 2009. The program promotes the planting of native species, the removal of noxious weeds, and the elimination of pesticides. Places like Utah and Sacramento, California, have started incentivizing residents to transition to sustainable alternatives, like xeriscaping, with direct payments. On a national level, the Homegrown National Park project encourages homeowners to plant native species to help increase backyard biodiversity; currently, over 11,000 people have listed their land on the map of participants, illustrating the enormous potential that can occur when we protect and regenerate our own little slices of wilderness as part of larger ecosystems.

Bethany Rydmark, a landscape designer based in Portland, tells me she’s noted an increased interest in sustainable landscaping over the past few

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years—especially this summer, when grass lawns were nearly impossible to keep green. And Rydmark has had a front-row seat to the shifting conversations surrounding grass lawns and more sustainable alternatives for decades: She grew up on a grass-seed farm about 30 miles south of Portland, where she loved to curl up in a shaded patch of grass and read. For her wedding, her father gifted her a meticulously mowed lawn for the ceremony, cross-hatched by the even lines of a riding mower. But in recent years, she’s advocated for more sustainable, drought-resistant alternatives, like wildflower-grass mixes and native ground covers. “Water in Portland is expensive. And [clients] are telling us how much they’re spending to keep their lawns alive—or just kicking themselves, because they’re not keeping it alive,” Rydmark says. “That becomes a really solid argument for asking, What if you could grow something that doesn’t take a bunch of water but still looks good?”

Last year she and her husband transitioned their own yard from grass to native, drought-resistant plants. And despite her passion for sustainable landscaping, it required an adjustment period. “This kind of lawn requires a mindset shift—especially [for] me, as a designer. I’m drawn to orderly lines,” she says. She still has an aerial shot of the manicured lawn from her wedding, hanging in her hallway.

When I drove to her home in northeast Portland in mid-August, I noticed flat yellow plot after flat yellow plot—dried-up grass that was dead or dormant. There was a stillness to the neighborhood as the warm summer sun bent toward the golden hour. But Rydmark’s yard was noticeably different. There was yellow there, too, but also many shades of green and brown, and little pops of white and purple. It had texture, variety, and movement; upon closer inspection, I saw hundreds of bees hovering and crawling through a mix of clover, fescue, yarrow, and English daisy. Rydmark says she and her daughters like to go on scavenger hunts to see what’s blooming. There’s always something new, and some of it she didn’t plant herself: their yard allows for different seeds to blow in on the wind and find a home.

The mindset shift required for this transition extends beyond a preference for clean, orderly lines. Rydmark says we also have to consider what lawns have represented for generations. “There’s been a connection for so long [between] the state of your yard and wealth and image,” she says. “But maybe the true value is in knowing that the land you’re caring for now has a variety of species, and that’s supporting other animals and insects, and you’re cultivating this ecologically healthy piece of land.”

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To this end, she hopes that her yard can serve as an example, to show neighbors what's possible when you let go of that attachment to the grass lawn and think more creatively. It certainly looks better than the neighbors' yellow grass.

In a neighborhood east of Rydmark's, I also visited Kevin Ward, who hired Rydmark to redesign his lawn to include native landscaping. It's been three years since he made the switch, and he loves it—as do his two young girls. He says they love exploring the different plants, collecting sticks and seeds for various make-believe scenarios, and helping with the vegetable garden. "There's a sense of wonder that happens when they get in there," he says. "It's really sparking their curiosity."

Ward's backyard is an enchanting mix of flowers, grasses, shrubs, and trees, but there is a clear sense of order and cohesiveness to the layout. His favorite aspect is just how little maintenance is required to keep it looking like this. By winter, all of these spindly, viny, colorful plants will go brown and dormant. Seed heads will pop out, and the birds will come to feast. Ward will eventually cut the shrubs back and let the trimmed bits fall to the ground, where they'll nourish new growth next spring. He used to mow every weekend. Now this maintenance takes place once a year.

After visiting these beautiful yards, I found myself thinking about the little version of me who loved to play outside. Whether I was upside down or right side up, the outdoors was an adventure slowly unfolding to reveal the interconnectedness of life, the fragility of nature, and the magic of it all. I would never want the little girl I once was—the one who cried when she couldn't save a single bird—to know that one million plant and animal species would be at risk of extinction by her thirties. But I think if she had known, she'd want to do something. She'd feed and protect whatever she could.

I wish the future didn't involve young people coming of age in a time of unfolding crisis. I wish I could know whether my hypothetical kid will be able to play outdoors year-round, without the threat of extreme heat or wildfires. The grass lawns of my childhood were greener—but perhaps memories of that significance are misleading. Digging deeper into the days I spent outdoors as a kid, I recall the woods behind our house in Connecticut with more clarity than any of the yards. That's where friends and I tramped across streams and down overgrown trails, where the sweet smell of freshly cut grass gave way to the dankness of soil and skunk cabbage. As I gained the freedom to explore, my inclination was to escape the confines of the yard, to go find places without fences. In

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fourth grade, my best friend and I hatched detailed plans to run away to Yosemite National Park. We never went through with it, but we researched the plants we might eat and the animals we might encounter if we did. As kids, we knew we were part of nature, and we wanted to embrace that connection. We certainly didn't care if the lawn was mowed.

The truth is, a green grass lawn is always trying to be something it's not. It's one of many ways humans have forced nature into something barely natural—and without questioning the purpose, we've held on to that tradition. Why? For our kids? Maybe. But as more and more people switch from grass to sustainable outdoor spaces for their families, I suspect the young ones won't mind the sacrifice. They'll keep doing what little humans have always done: getting dirty and learning to love the earth as it is.

outsideonline.com, 29 October 2021

<https://www.outsideonline.com>

The secret to longer-lasting clothes will also reduce plastic pollution

2021-10-29

If there's one thing every fitness enthusiast, athlete, and lover of the outdoors has an overabundance of, it's synthetic apparel. After all, materials like polyester, nylon, and acrylics simply excel at wicking moisture, dry out quickly, and can really take a beating.

But all those synthetics are made of plastics. And when these fibers break or pill, they shed tiny threads that often end up in our soil and water supply, causing health and environmental problems. As careful as you may be, the No. 1 culprit behind all those loose particles is right inside your home: your washing machine.

Fortunately, there are easy ways to keep microplastics from polluting the planet every time you run a load.

Why should I care about microplastics?

As the name suggests, microplastics are small pieces of plastic or plastic fibers that are frequently invisible to the naked eye. As such, fighting to prevent their release is less sexy than advocating against plastic straws or bags—endeavours that are commonly accompanied by heart-wrenching images of turtles choked by trash. But microplastics are still an urgent threat to our environment, says marine biologist Alexis Jackson. And she would know: she has a Ph.D. in ecology and evolutionary biology and has

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extensively studied the plastics in our oceans as the ocean policy lead for the California chapter of the Nature Conservancy.

But unlike buying metal straws or collecting reusable shopping bags, the solution to this microscopic problem isn't clear. For starters, microplastics are so, well, micro, that wastewater treatment plants usually can't filter them out.

When they slip through, they end up pretty much everywhere. They've even been detected in the arctic. And they're more than just a nuisance: any animal that eats these minuscule plastic threads may end up with blocked digestive tracts, decreased energy, and less of an appetite, all of which can result in stunted growth and reduced reproductive abilities. Plus, microplastics have been shown to absorb harmful chemicals like heavy metals and pesticides, carrying those toxins into the bodies of plankton, fish, sea birds, and other wildlife.

From there, the dangerous chemicals can work their way up the food chain and show up in your seafood dinner, not to mention your tap water.

Unfortunately, we don't yet have data on the potential long-term effects of microplastics on human health. But since we know they are harmful to animals (and plastic isn't a recommended part of a healthy, balanced diet), Jackson points out that it's safe to say we should probably avoid putting them in our bodies.

Tips for laundry day

When it's time to wash your leggings, basketball shorts, or moisture-wicking tanks, there are a few things you can do to keep microplastics out of the environment.

Start by separating your clothing items—not by color, but by material. Wash rough or coarse clothes like jeans separately from softer items like polyester T-shirts and fuzzy fleece sweaters. This way, you reduce the friction caused by rougher materials crashing into more delicate ones for 40 minutes. Less friction means your clothes won't wear out as fast and the fibers will be less prone to premature breakage.

Then, make sure you're using cold water instead of hot. Heat weakens fibers and makes them more likely to break; cold water will help them last longer. Next, run a short cycle instead of a normal or long one, which will limit the opportunity for fiber breakdown. While you're at it, reduce the speed of the spin cycle if you can—this will reduce friction even further.

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One study showed that together, these methods reduced microfiber shedding by 30 percent.

While we're on the subject of washer settings, avoid the delicate cycle. That may run contrary to your beliefs, but it uses more water than other washing modes to prevent friction—and a higher ratio of water to fabric actually increases fiber shedding.

Finally, skip the dryer altogether. We can't emphasize this enough: heat can shorten the life of materials and make them more likely to break in the next load of laundry. Fortunately, synthetic clothing dries fast, so hang it outside or over your shower rod instead—you might even save money by not running your dryer so frequently.

Once your clothes are washed and dried, don't go back to the washer for a while. Many items don't need to be washed after every use, so put those shorts or that shirt back in the dresser for another wear or two if it doesn't smell like wet dog after one use. If there's just one dirty spot, wash it out by hand instead of starting a load.

There are also several tools you can use to reduce microfiber shedding. Guppyfriend makes a laundry bag specifically designed to capture broken fibers and microplastic waste, but also to prevent fiber breakdown in the first place by protecting clothing. Just place your synthetics inside, zip it shut, toss it in the washer, and pick out any and dispose of any microplastic lint that gets caught in the corners of the bag. Even standard laundry bags help reduce friction, so those are an option as well.

A separate lint filter that attaches to your washing machine's discharge hose is another effective and endlessly reusable option, shown to reduce microplastics by up to 80 percent. But don't spring for those laundry balls that are supposedly meant to catch microfibers in the wash: the beneficial results are comparatively minimal.

As for detergent, many popular brands contain plastic, including those handy pods, which break down into microplastic particles in the washing machine. But finding out which detergents are the culprits requires some digging. Learn how to find out if your detergent is really environmentally friendly before you restock, or consider making your own. Then take care of your synthetics, starting on laundry day.

popsci.com, 29 October 2021

<https://www.popsci.com>

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WWII 'ghost ships' rise from Pacific after volcanic eruption

2021-10-28

Seismic activity from an underwater volcano near Tokyo has raised two dozen "ghost ships" — sunk after one of World War II's most famous battles — from the bottom of the Pacific Ocean.

Helicopter footage from Japan's All Nippon News (ANN) captured the 24 ships washed ashore on the western side of the island of Iwo Jima, which is roughly 760 miles (1,200 kilometers) south of Tokyo, after they were pushed up, along with the seabed, by the underwater volcano Fukutoku-Okanoba.

U.S. forces sank the ships during the Battle of Iwo Jima in 1945. One of the bloodiest battles in World War II, the 36-day assault saw roughly 70,000 U.S. Marines fight around 20,000 Japanese soldiers hiding out in bunkers within the island's volcanic rocks. By the end of the battle, 20,000 marines had been wounded and nearly 7,000 killed. Nearly all of the Japanese soldiers, save for 216 captured alive, were killed in action.

PLAY SOUND

The smashed, sea-bleached wrecks are the remnants of transport vessels that were captured by the U.S. Navy and deliberately scuttled in the aftermath of the battle. As Iwo Jima had no port, the ships were sunk parallel to the shoreline to form a breakwater — shielding both weapons and troops from oncoming waves as they were unloaded onto the island, according to the US National Archives.

Fukutoku-Okanoba has been erupting underwater since August. Besides pushing the ships, and the seabed they are resting upon, into view, the seismic activity produced by the volcano has led to the emergence of a small, crescent moon-shaped island from the sea. Formed from pumice and volcanic ash, the island is expected to vanish soon due to erosion, according to Setsuya Nakada, the director of the Japanese government's Center for Integrated Volcano Research.

Iwo Jima is part of the Bonin Islands, a chain of roughly 30 subtropical islands in the Pacific Ocean. Created by the subduction of the Pacific tectonic plate below the Philippine Sea Plate, the island chain is prone to earthquakes and volcanic eruptions, and it has been experiencing an uptick of seismic events in recent weeks, according to Japan's Meteorological agency. For instance, on Oct. 7, a magnitude-5.9 tremor

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shook buildings across Tokyo and eastern Japan. And another volcanic island in the chain, Nishinoshima, has been spewing gas and lava since 2013.

Iwo Jima's Mount Suribachi is the dormant vent to a still-active volcano, and is considered by some to be among the 10 most dangerous volcanoes in the world, according to a list made by one astrophysicist. In fact, there's every indication that the current spate of seismic activity could be building toward an eruption.

"The discolored sea area has spread to surrounding areas, which indicates that the volcanic activity has not diminished yet," Nakada told the All Nippon News channel. "There is a possibility of a big eruption on Iwo Jima."

Barring another eruption of Mount Suribachi or the sinking of the seabed that the ghost ships are resting upon, the once sunken monoliths will likely remain on the island for some time to come. Iwo Jima is uninhabited and rarely visited by civilians — partly as a result of the enormous quantities of unexploded bombs and grenades left behind on the island — meaning that it is unlikely that the ships will be cut up for scrap or removed by Japanese authorities.

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An elusive equation describing bird eggs of all shapes has been found at last

2021-10-29

For years, scientists have tried to crack a mathematical mystery: Is there an equation that can perfectly describe each and every bird egg? Variable shell shapes complicated things. But it turns out the answer is simple. A formula using just four easily measured dimensions can calculate the shape of any avian egg, be it round as a ping-pong ball, a smooshed sphere, oblong or a curvaceous pear, researchers report in an upcoming issue of the Annals of the New York Academy of Sciences.

It was that last shape that had eluded the eggs-perts. They found themselves yoked to an equation that couldn't accurately describe pyriform, or conical, eggs. Previously, researchers developed an equation that accounted for spherical brown hawk owl eggs (SN: 6/22/17), elliptical emu eggs (SN: 10/31/18), ovoid osprey eggs and other similarly shaped

But it turns out the answer is simple.

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eggs. But that formula didn't apply to the pear-shaped eggs from birds like great snipes and King penguins.

The new formula needs four inputs: the egg's length, its maximum breadth, its diameter at the spot where its pointed end terminates and the location of its maximum diameter in relationship to the midpoint of its length. Adding one additional function and incorporating that last diameter variable to existing egg math led to the universal equation.

The finding could have real-life implications, says Darren Griffin, a geneticist at the University of Kent in England, who did the work along with Kent biologist Michael Romanov and Valeriy Narushin, an agricultural engineer formerly at Kent. For example, being able to calculate an egg's shape could help designers create better padded or form-fitting egg containers, minimizing grocery store waste or that disappointing moment of arriving home with a carton of eggs, opening the lid and finding your eggs cracked. "We're all supposed to check in the box" before leaving the store, but it's easy to forget, says Griffin.

The equation could also come in handy in conservation efforts. When reintroducing a bird species, "one of the considerations would be 'How likely are the eggs to break?'" Griffin says. Knowing an egg's math could help researchers calculate what parts are most vulnerable to cracking, which in turn could help them assess where and how best to place them in certain habitats to help grow the population in those areas.

The formula's simplicity "makes this approach practical for field studies" and could even enable researchers to collect the measurements from digital photographs, says Mark Hauber, an ornithologist at the University of Illinois at Urbana-Champaign. "My lab had been working on something like this, but we weren't able to derive the new math." His recent work has focused on determining "how birds themselves can tell if an object is naturally egg-shaped or an artificial shape that shares some of the geometry with natural eggs."

The discovery of the egg equation came while the researchers were exploring how to nondestructively assess the sexes of avian embryos before eggs are incubated. They were looking for physical differences between the attributes of eggs containing female and male embryos, Narushin says. The universal formula is an initial step in "resolving such an enigma." Now they're working on a new brood of egg problems, searching for a universal formula for computing the volume and surface area of

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various eggs, as well as exploring "mathematical shell secrets," such as why shell thickness differs by species.

sciencenews.org, 29 October 2021

<https://www.sciencenews.org>

Why does cold fresh air help nausea go away?

2021-11-01

Imagine you're driving down the highway, enjoying the start of a long road trip, when all of a sudden one of the children in your back seat moans, "I don't feel so good." Your immediate response, besides scrambling for a barf bag, would probably be to crack the windows to let in fresh air.

So why does cold air help get rid of nausea?

"When trying to understand why fresh, circulating, or cold air seems to help alleviate symptoms of nausea, it's ideal to look at research related to motion sickness," Dr. Robert Glatter, an emergency physician at Lenox Hill Hospital in New York City, told Live Science in an email. People experiencing motion sickness often "seek colder temperatures or environments with improved air circulation, or choose options that cool our bodies down, when in fact the actual mechanism behind [nausea] involves a drop in our core body temperature," he said. **PLAY SOUND**

The hallmark symptoms of motion sickness are nausea, vomiting and sweating. Lesser known is that when a person gets motion sick, their core body temperature drops. They actually become slightly hypothermic. This phenomenon was first noticed about 150 years ago in sailors suffering from seasickness, but scientists began to study this phenomenon only in the last several decades, according to a study published in 2014 in the journal *Temperature*.

Capillaries in the skin dilate during motion sickness, which allows more blood to flow through close to the skin's surface, losing heat to the environment and lowering core body temperature. This process goes hand-in-hand with breaking out into a sweat to further lower their body temperature, which a person may experience as a "cold sweat" since they're slightly hypothermic.

When a motion-sick person's temperature drops, their central nervous system, specifically the hypothalamus, the part of the brain that regulates body temperature, tries to counteract the plunge. So although their core

So why does cold air help get rid of nausea?

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temperature is low, a nauseated, motion-sick person may actually feel hot and flushed.

This drop in temperature and the body's compensation reaction to it are actually what make a person feel nauseated, Glatter said. Getting cold air or placing a cool compress on the back of the neck or forehead for a few minutes can help reduce the feeling of being hot or flushed because it counteracts the hypothalamus' efforts to raise body temperature, thus easing the feeling of nausea.

Experts aren't quite sure why the temperature change associated with motion sickness occurs. One potential reason could be that at a lower temperature, tissues need less oxygen to survive, and it may be more difficult for a person to get enough oxygen when they're ill. However, it's "more likely an adaptive response influenced by poorly understood mechanisms at the cellular level," Glatter said.

Similarly, experts also aren't sure why the temperature drop and subsequent compensation to increase body temperature leads to nausea. One theory suggests that both the nausea and temperature change may be a natural way the body defends itself in response to toxins. Nausea often leads to vomiting, which can clear toxins from a person's system. So-called "defensive hypothermia" may also protect against toxins by conserving the person's energy so they can focus on fighting the invader, according to a 2016 review in the journal *The Quarterly Review of Biology*.

"If we assume that the 'cold sweats' associated with nausea are a part of natural defense against poisoning or infection, lowering of body temperature after detection of a toxin could be part of an evolutionary approach that results in 'defensive hypothermia,'" Glatter said. According to the 2014 study, evidence that "defensive hypothermia" occurs during toxic shock in human and animal models supports this theory.

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<https://www.livescience.com>

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Technical Notes

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