CHEMWATCH

Bulletin Board

Contents

MAR. 05, 2021

(click on page numbers for links)

CONTACT US

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

1227 Glen Huntly Rd
Glen Huntly
Victoria 3163 Australia

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

Contents

GOSSIP

CURIOSITIES

TECHNICAL NOTES

CHEMWATCH
Bulletin Board

Regulatory Update

ASIA PACIFIC

Improving ventilation in indoor workplaces – COVID-19

2021-02-05

This fact sheet has information about ventilation in indoor workplaces. Ensuring heating, ventilation and air conditioning (HVAC) systems are well-maintained and operating properly is important for indoor workplaces to manage the risk of COVID-19 transmission.

https://www.safeworkaustralia.gov.au/sites/default/files/2021-02/210224%20COVID-19%20Indoor%20Ventilation%20Factsheet_24_feb.pdf

Safe Work Australia, 5 February 2021

https://www.safeworkaustralia.gov.au

Gazette – Agricultural and Veterinary Chemicals

2021-02-23

Edition No. 4, 23 February 2021, published by the Australian Pesticides and Veterinary Medicines Authority (APVMA) is now available on the APVMA website.

The APVMA publishes the Gazette every second Tuesday.

As a subscriber, you will receive an email notification each time a new Gazette is published.

Contents

- Agricultural Chemical Products and Approved Labels – 4
- Veterinary Chemical Products and Approved Labels – 12
- Approved Active Constituents – 16
- Amendments to the APVMA MRL Standard – 19
- Proposal to amend Schedule 20 in the Australia New Zealand Food Standards Code – 20
- Variations to Schedule 20 of the Australia New Zealand Food Standards Code – 26
- Notice of Cancellation at the Request of the Holder – 34

This fact sheet has information about ventilation in indoor workplaces.

Read More

You can access back issues of the Gazette from August 1999.

APVMA, 23 February 2021

https://apvma.gov.au/node/80536

The APVMA's strong performance continues

2021-02-23

The Australian Pesticides and Veterinary Medicines Authority (APVMA) continues to demonstrate improvements in its time frame performance, finalising 96% of all applications within timeframe in the December quarter 2020, ahead of the 94% recorded in September quarter 2020.

This included an increase in the rate of product applications completed on time with both pesticides and veterinary medicines increasing to 99%, up from 98% in September quarter 2020.

The APVMA also achieved improvements in the percentage of major product applications finalised within timeframe, with major pesticides and veterinary medicines applications increasing to 99% and 93% respectively at the end of the December quarter 2020.

The results of the December quarter 2020 performance report reflect the APVMA's commitment to providing a robust and efficient regulatory system that provides Australians with timely access to safe and effective agricultural and veterinary chemical products that support agricultural productivity and improved animal health.

View the December quarter 2020 performance report.

APVMA, 23 February 2021

https://apvma.gov.au/

AMERICA

Chemicals in plastic damage babies' brains and must be banned immediately, expert group says

2021-02-20

Synthetic chemicals called phthalates are damaging children's brain development and therefore must be immediately banned from consumer

This included an increase in the rate of product applications completed on time with both pesticides and veterinary medicines increasing to 99%, up from 98% in September quarter 2020.

CHEMWATCH
Bulletin Board
Regulatory Update
MAR. 05, 2021

products, according to a group of scientists and health professionals from Project TENDR.

Project TENDR, which stands for Targeting Environmental Neuro-Development Risks, is a group of volunteer scientists, health professionals and child advocates working to study and reduce children's exposure to neurotoxic chemicals and pollutants.

"What we want to accomplish is to move the public health community, including regulators, toward this goal of elimination of phthalates," said lead author Stephanie Engel.

"We have enough evidence right now to be concerned about the impact of these chemicals on a child's risk of attention, learning and behavioral disorders," said Engel, a professor of epidemiology at the University of North Carolina at Chapel Hill Gillings School of Global Public Health.

"I hope that this paper will act as a wake-up call to understand that early life exposure to this class of chemicals is affecting our children," said toxicologist Linda Birnbaum, former director of the National Institute for Environmental Health Sciences, as well as the National Toxicology Program. She was not involved in the paper.

"When you have the same kind of findings repeated in multiple populations, done by different investigators using different tools and approaches and you keep coming up with the same finding, I think you can begin to say that the data is pretty clear," Birnbaum said.

CNN reached out for comment from the trade association American Chemistry Council.

"While we are encouraged by continuous research efforts into the science and health of phthalates, we are concerned about the over interpretation of studies that have not established a causal link between phthalates and human adverse health effects," said Eileen Conneely, senior director of the chemical products and technology division of ACC.

Read More

CNN, 20 February 2021

https://www.channel3000.com/chemicals-in-plastics-damage-babies-brains-and-must-be-banned-immediately-expert-group-says/

EPA orders testing for nine chemicals

2021-02-22

Companies must test for ecotoxicity and skin absorption and inhalation exposures. The U.S. Environmental Protection Agency (EPA) announced on January 15, 2021, that it has issued test orders under Section 4 of the Toxic Substances Control Act (TSCA) to obtain additional data on nine of the next 20 chemicals undergoing risk evaluation. Many in the industrial chemical community expect the EPA to use its TSCA testing authority much more in the coming years. The January orders seem to confirm that expectation. This article discusses the significance of the action.

Read More

Chemical Processing, 22 February 2021

https://www.chemicalprocessing.com/articles/2021/epa-orders-testing-for-nine-chemicals

EPA seeks participants for small business review panel on risk management rulemaking for PV29

2021-02-22

The U.S. Environmental Protection Agency (EPA) **announced** on February 19, 2021, that it is inviting small businesses, governments, and not-for-profits to participate as Small Entity Representatives (SER) to provide advice and recommendations to a Small Business Advocacy Review (SBAR) Panel for C.I. Pigment Violet 29 (PV29). The Panel will focus on EPA's development of a proposed rule to address unreasonable risks identified in EPA's recently completed Toxic Substances Control Act (TSCA) risk evaluation for PV29. As reported in our January 25, 2021, **memorandum**, EPA reviewed 14 conditions of use for PV29, including as an intermediate for other perylene pigments, as well as a component of paints, coatings, industrial carpeting, and plastic and rubber products used primarily in the automobile industry, in ink used for commercial printing, and in consumer watercolors and artistic paints. EPA determined that there are unreasonable risks to workers and occupational non-users (ONU) from ten out of 14 conditions of use. EPA found no unreasonable risks to the environment, consumers, or the general public. EPA is now moving to the risk management step in the TSCA process by working to draft regulations to protect public health from the unreasonable risks identified in the final risk evaluation.

Many in the industrial chemical community expect the EPA to use its TSCA testing authority much more in the coming years.

CHEMWATCH
Bulletin Board
Regulatory Update
MAR. 05, 2021

According to EPA, the Regulatory Flexibility Act requires agencies to establish an SBAR Panel for rules that may have a significant economic impact on a substantial number of small entities. The SBAR Panel will include federal representatives from the Small Business Administration (SBA), the Office of Management and Budget (OMB), and EPA. The SBAR Panel will select SERs to provide comments on behalf of their company, community, or organization and advise the Panel on the potential impacts of the proposed rule on small entities. EPA states that it is seeking self-nominations directly from the small entities that may be subject to the rule's requirements. EPA notes that other representatives, such as trade associations that exclusively or at least primarily represent potentially regulated small entities, may also serve as SERs. Self-nominations may be submitted **online** and must be received by **March 5, 2021**.

Read More

TSCA Blog, 22 February 2021

http://www.tscablog.com/entry/epa-seeks-participants-for-small-business-review-panel-on-risk-managem

The grace period for Proposition 65 cannabis and CBD reproductive harm warning expired on January 3 – are your labels compliant?

2021-02-24

New Proposition 65 warning requirements applicable to cannabis and CBD products took effect on January 3, 2021, after a one-year enforcement grace period. Companies who manufacture, distribute, or sell at retail THC products in California – including CBD products made with industrial hemp – are now required to warn consumers that exposure to THC is known to the state of California to cause reproductive harm. As we discussed in a prior publication, this change in the law brings a wider range of cannabis and CBD products into the scope of Proposition 65, and companies that manufacture or sell cannabis or CBD products will need to reevaluate their label warnings or risk potentially costly litigation from an aggressive plaintiffs' bar.

California's Safe Drinking Water and Toxic Enforcement Act of 1986, known commonly as "Prop 65," is a state law that requires labeling of products that contain chemicals the state has designated as being known to cause cancer, birth defects, or other reproductive harm. On January 3, 2020, the state listed both cannabis (marijuana) smoke and delta-9-

The one-year grace period initially offered to come into compliance with the new requirements expired on January 3, 2021.

tetrahydrocannabinol (THC) as reproductive toxins under Proposition 65. The one-year grace period initially offered to come into compliance with the new requirements expired on January 3, 2021.

The effect of the change in the law is to require Prop 65 warnings on some products that did not previously require them (edibles, for example), and additional Prop 65 warnings on some products that already contain them (e.g., smokeable products). The listing does not include a safe harbor limit, meaning that products with **any** detectable level of THC – including, for example, CBD products that contain less than 0.3% THC in conformance with federal law – will require Prop 65 warning labels. As a result, products made or infused with cannabis or CBD must be labeled in accordance with Prop 65.

Prop 65's warning requirements apply to any business in the chain of distribution, including manufacturers, distributors, and retailers (including out-of-state companies selling products in California). Companies that sell cannabis or CBD products in California can take advantage of the safe harbor provisions of Prop 65 and avoid potential litigation by providing warnings that satisfy the complex and specific requirements of the regulation. It will be important for these companies to consult with experienced regulatory counsel prior to creating packaging or labeling to ensure that they comply with Prop 65 and other labeling requirements promulgated by the California Department of Public Health ("CDPH").

Read More

National Law Review, 24 February 2021

https://www.natlawreview.com/article/grace-period-proposition-65-cannabis-and-cbd-reproductive-harm-warning-expired

EUROPE

EU Commission illegally allowed use of toxic chemical DEHP in recycled plastic – Advocate General

2021-02-26

EU Advocate General Kokott has found that the European Commission illegally disregarded the hormone-disrupting risks posed by the phthalate DEHP when it approved its presence in PVC materials and products.

A known endocrine disruptor, DEHP has reported impacts on health and the environment, as it affects fertility, the development of the unborn child

Its presence in recycled materials can lead to workers, consumers and the environment being exposed during the lifecycle of PVC products.

CHEMWATCH
Bulletin Board
Regulatory Update
MAR. 05, 2021

and aquatic life. Its presence in recycled materials can lead to workers, consumers and the environment being exposed during the lifecycle of PVC products.

The news is the latest development in a ClientEarth court case. The environmental law charity asked the Commission to review this authorisation in 2016, and challenged its refusal to do so before the General Court of the EU in 2017.

The lawyers argued that this authorisation breached REACH – the main EU chemicals law – on several grounds.

The General Court of the EU rejected ClientEarth's claims in the first instance, but today, in the latest stage of the case, Advocate General Kokott supported the lawyers on several key arguments.

ClientEarth chemicals lawyer Dr Apolline Roger said: "Leniency with chemicals authorisation in the past is what's given us the contaminated products we are dealing with today – such as highly dangerous DEHP in recycled PVC. We are absolutely delighted that Advocate General Kokott has opted for an interpretation of the REACH regulation that takes into account the real-life impact of this harmful chemical.

"When authorising the use of DEHP, the Commission intentionally ignored some of its dangers. As a result, it didn't properly balance the socio-economic benefits and risks of allowing DEHP to be used in recycled products, as required by REACH. We hope that the European Court of Justice will follow the path recommended by Advocate General Kokott and annul the decision of the General Court."

But ClientEarth's lawyers have also pointed to broader issues with the use of chemical regulation to manage contaminated recycled material that have not been fully addressed by Advocate General Kokott

Roger said: "The REACH authorisation process was not created to address the undesired presence of legacy contaminants, like DEHP in recycled PVC. It was set up to handle the intentional use of harmful chemicals by companies or their downstream users.

"The REACH authorisation process lacks the tools needed to handle this type of situation: full life-cycle evaluation, comparison of end-of-life solutions, systems to ensure the traceability of recycled materials and products. The mismatch between the tools and the work to do automatically leads to poor decisions.

"But the Advocate General did not reject this inadequate application of REACH. We hope the EU Court might judge differently.

"We need a circular economy that is healthy – not one that allows toxic substances to creep in. We call on the Commission and the Member States to find a better long-term solution than using REACH authorisations to paper over the gaps between chemical and waste regulation, to maintain trust in recycled materials."

The final verdict of the Court of Justice of the European Union is expected within the year.

Read More

Client Earth, 26 February 2021

https://www.clientearth.org/latest/eu-commission-illegally-allowed-use-of-toxic-chemical-dehp-in-recycled-plastic-advocate-general/

EC gathering experts for chemicals strategy

YYYY-MM-DD

On February 17, 2021, the *European Commission (EC)* announced a call for applications to join an expert group on the implementation of the Chemicals Strategy for Sustainability. Led by the *Directorate General for the Environment (DB Environment)* together with other *EC* organizations, the aims of the new group will be "to monitor progress of the Strategy's implementation and to support the transition to safe and sustainable chemicals and to a toxic-free environment." Discussions by this new group will be held in addition to the formal public consultations launched within the strategy's implementation.

Applications for membership in the group are being accepted until March 18, 2021.

The group will consist of up to 32 members, with quotas set for membership from 10 civil society organizations, 8 scientific organizations from academia and research groups, 10 industries, and 3 intergovernmental organizations. The strategy has specifically set out plans to act on improving the safety of chemicals present in food contact materials (FCMs; FPF reported). Applications for membership in the group are being accepted until March 18, 2021.

European Commission (February 17, 2021). "High Level Roundtable on the implementation of the Chemicals Strategy for Sustainability (E03757)."

CHEMWATCH
Bulletin Board
Regulatory Update
MAR. 05, 2021

Read More

Food Packaging Forum, 23 February 2021

https://www.foodpackagingforum.org/news/ec-gathering-experts-for-chemicals-strategy

INTERNATIONAL

OECD publishes developments on the safety of manufactured nanomaterials in Tour de Table

2021-02-19

The Organization for Economic Cooperation and Development (OECD) has published the latest edition of the *Developments in Delegations on the Safety of Manufactured Nanomaterials — Tour de Table*. The *Tour de Table* compiles information provided by delegations on the occasion of the 20th meeting of the OECD Working Party on Manufactured Nanomaterials (WPMN) in September 2020. Below are highlights from the *Tour de Table*:

Since January 2005, EPA has received and reviewed more than 230 new chemical notices for nanoscale materials under TSCA, including fullerenes, quantum dots, and carbon nanotubes.

- Canada: Canada is developing a nanomaterial regulatory risk assessment framework to outline approaches and key considerations (*e.g.*, unique properties of nanomaterials). The framework will inform the assessment of manufactured nanomaterials under the Canadian Environmental Protection Act, 1999 (CEPA), including existing nanomaterials in commerce in Canada, and new nanomaterials notified prior to being manufactured or imported into Canada. It will provide guidance to regulators on the assessment of nanomaterials for their risk to the environment and human health. According to the *Tour de Table*, Canada will share a draft risk assessment framework with partners of the OECD WPMN for peer-review.
- **United States: The U.S. Environmental Protection Agency (EPA) completed review of low volume exemptions for two graphene oxide substances, a metal oxide substance, and a carbon nanotube. EPA allowed the exemptions under conditions that limit human and environmental exposures to prevent unreasonable risks. Additionally, EPA reviewed and completed six pre-manufacture notices (PMN) for nanoscale materials, including one carbon nanotube and six quantum dots. These new chemical substances were regulated with consent orders owing to limited available data on nanomaterials; these consent orders limit uses**

and human and environmental exposure to prevent unreasonable risks.

Between November 2018 and August 2020, EPA received notification of ten nanoscale substances that met reporting criteria pursuant to its authority under Section 8(a) of the Toxic Substances Control Act (TSCA), bringing the total number of notifications to 77. Reporting criteria exempt nanoscale chemical substances already reported as new chemicals under TSCA and those nanoscale chemical substances that do not have unique or novel properties. Most reporting was for metals or metal oxides.

Since January 2005, EPA has received and reviewed more than 230 new chemical notices for nanoscale materials under TSCA, including fullerenes, quantum dots, and carbon nanotubes. EPA has issued consent orders and significant new use rules (SNUR) regulating new chemical submissions of these nanoscale materials permitting manufacture under limited conditions.

European Union (EU): Amendments to Annex II of the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) regulation to address nanomaterials took effect on January 1, 2020. By January 1, 2020, the European Chemicals Agency (ECHA) had received 86 unique submissions for 34 substances covering nanomaterials. ECHA had received a further 37 unique submissions by May 31, 2020 (*i.e.*, by the deadline for submissions to the *Tour de Table*), resulting in a total of 54 substances covering nanoforms for which registration dossiers have been submitted following the updated REACH requirements. Up-to-date information on the nanomaterials registered under REACH, as well as information on nanomaterials notified to different EU nanomaterial inventories, can be found on the EU Observatory for Nanomaterials (EUON) website.

Read More

National Law Review, 19 February 2021

https://www.natlawreview.com/article/oecd-publishes-developments-safety-manufactured-nanomaterials-tour-de-table

CHEMWATCH
Bulletin Board
REACH Update

EUON publishes nanopinion on using eREACHNano to register nanoforms under REACH

2021-02-22

On February 19, 2021, the European Union (EU) Observatory for Nanomaterials (EUON) published a Nanopinion entitled "eREACHNano helps you to register nanoforms under REACH" by Dorte Rasmussen, Ph.D., who has been working on the exposure and risk assessment of chemicals at DHI A/S for almost 25 years. Rasmussen describes eREACHNano, a tool developed to explain Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) regulation requirements for nanoforms. According to Rasmussen, eREACHNano guides companies through the registration process for nanoforms and the registration requirements using e-learning modules developed through the eREACHNano project by DHI A/S in cooperation with the N-Nano project group, a working group of the Nordic Council of Ministers. Rasmussen states that eREACHNano provides an introduction to nanoforms, describing the main elements of REACH, its actors, and their roles and responsibilities. The tool places extra emphasis on describing the documentation on safe use and explaining where the distinction between bulk chemicals and nanoforms should be made. Rasmussen notes that eREACHNano focuses on — but is not limited to — helping small- and medium-sized companies that may not have sufficient in-house expertise on regulations that cover nanomaterials.

Rasmussen describes eREACHNano, a tool developed to explain Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) regulation requirements for nanoforms.

Read More

Nano and Other Emerging Chemical Technologies Blog, 22 February 2021

https://nanotech.lawbc.com/2021/02/euon-publishes-nanopinion-on-using-ereachnano-to-register-nanoforms-under-reach/

EU public consultation: Derogation to the exclusion criteria – Creosote

2021-01-22

Biocidal active substances and products in Northern Ireland are still regulated under the EU Biocides Regulation 528/2012 (EU BPR).

If an active substance meets the exclusion criteria set out in Article 5 (1) of the EU BPR, it normally would not be approved for use in biocidal products in the EU (which includes Northern Ireland but not Great Britain). However, the active substance could receive a derogation under Article 5 (2) of the EU BPR when it is shown that:

- exposure is negligible;
- the active substance is essential to prevent a serious danger to human or animal health or the environment; or
- not approving the substance would have a disproportionate negative impact on society compared to the risks

A derogation would allow the active substance to be approved for use in biocidal products in the EU (including Northern Ireland).

The following active substance / product type combination meets the EU BPR Article 5 (1) exclusion criteria in the EU:

- **Creosote (CAS No. 8001-58-9) for product-type 8 (wood preservatives)**

To decide if this active substance approval may be renewed or not in the EU (including Northern Ireland), the European Chemicals Agency (ECHA) has launched a public consultation to collect information on whether the conditions for derogation are satisfied.

This EU consultation runs until 30 March 2021.

Comments should be submitted to ECHA (not HSE) using the dedicated webform.

Please note this consultation and its outcome are not applicable to the active substance approval (and biocidal products containing it) in Great Britain under the GB Biocidal Products Regulations (GB BPR).

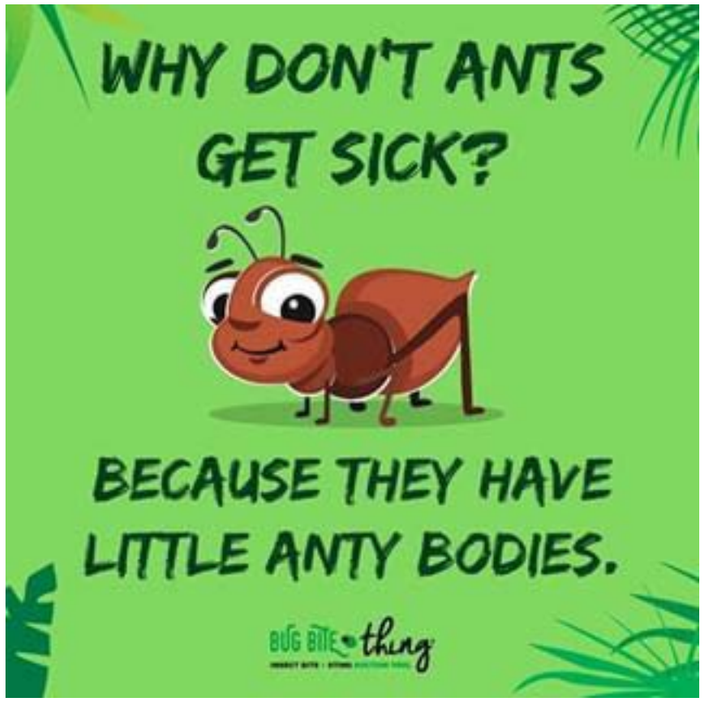
HSE Biocides eBulletin, 22 February 2021

https://echa.europa.eu/derogation-to-the-exclusion-criteria-current-consultations/-/substance-rev/27202/term?utm_source=govdelivery&utm_medium=email&utm_campaign=eu-exit-hse&utm_term=link-1&utm_content=biocides-22-feb-21

CHEMWATCH
Bulletin Board

Anty Bodies

2021-03-05



https://www.instagram.com/p/CDwUUddlI0P/

Methyl Isocyanate

2021-03-05

Methyl Isocyanate (MIC) is an organic compound with the molecular formula CH_3NCO. It is also known as isocyanatomethane, methyl carbylamine, and MIC. [1] Under normal conditions, Methyl isocyanate is a colourless liquid, which has a sharp, pungent smell. It evaporates easily at room temperature and boils at 44 degrees Celsius. Methyl isocyanate vapours are dense and can collect in low-lying areas, where they can form potentially explosive mixtures with air. It is also highly flammable and reacts violently with water, forming Ureas and large amounts of Carbon dioxide in the process. Methyl isocyanate corrodes certain metals and attacks some plastics, rubbers and coatings. When heated, it breaks down to give toxic gases such as hydrogen cyanide, carbon monoxide and oxides of nitrogen. Methyl isocyanate is one of a group of substances known as the volatile organic compounds (VOCs). [2]

USES [2]

Methyl isocyanate is used in the chemical industry to produce a number of important chemicals. It is also involved in the manufacture of synthetic rubbers, adhesives, herbicides and pesticides.

SOURCES & ROUTES OF EXPOSURE

Sources of Exposure [3]

- Methyl isocyanate has been found in the smoke from tobacco, so people who smoke or breathe second-hand smoke may be exposed to this compound.
- You can be exposed to methyl isocyanate by breathing or touching it at workplaces where this compound is produced or used.
- People living near facilities, which manufacture, store or use the chemical may breathe in low levels of it.

Routes of Exposure [4]

- Inhalation: Inhalation is the major route of exposure to methyl isocyanate. The vapours are readily absorbed through the lungs. The odour threshold is approximately 100 to 250 times higher than the OSHA PEL-TWA (0.02 ppm). Significant exposures to methyl isocyanate occur primarily in occupational settings.

Methyl Isocyanate (MIC) is an organic compound with the molecular formula CH3NCO.

CHEMWATCH
Bulletin Board
Hazard Alert
MAR. 05, 2021

- Skin/Eye Contact: Direct contact with liquid or concentrated vapours of methyl isocyanate. This would not likely occur outside an occupational environment in which methyl isocyanate is stored or used.
- Ingestion: Although unlikely, ingestion of liquid methyl isocyanate is a possible route of exposure.

HEALTH EFFECTS [5]

Acute Effects

- In 1984, in Bhopal, India, an accidental Union Carbide gas leak of methyl isocyanate resulted in the deaths of more than 2,000 people and adverse health effects in greater than 170,000 survivors. Pulmonary oedema was the cause of death in most cases, with many deaths resulting from secondary respiratory infections such as bronchitis and bronchial pneumonia.
- Other effects noted from acute inhalation exposure to methyl isocyanate in humans are respiratory tract irritation, difficulty breathing, blindness, nausea, gastritis, sweating, fever, chills, and liver and kidney damage. Survivors continue to exhibit damage to the lungs (e.g., bronchoalveolar lesions and decreased lung function) and the eyes (e.g., loss of vision, loss of visual acuity, and cataracts).
- Animal studies have reported pulmonary oedema, upper respiratory tract irritation, respiratory lesions, and weight loss from acute inhalation exposure to methyl isocyanate.
- Acute animal tests in rats have shown methyl isocyanate to have extreme acute toxicity from inhalation exposure and high acute toxicity from oral exposure.

Chronic Effects

- No information is available on the chronic (long-term) effects of methyl isocyanate in humans or animals.
- EPA has not established a Reference Concentration (RfC) or a Reference Dose (RfD) for methyl isocyanate.
- CalEPA has calculated a chronic inhalation reference exposure level of 0.001 milligrams per cubic meter (mg/m^3) based on lung and body weight effects in rats.

Reproductive/Developmental Effects

- After the Bhopal, India, accident, an unusually high percentage of survivors had disorders of the reproductive system, including

leukorrhea, pelvic inflammatory disease, excessive menstrual bleeding, and suppression of lactation.
- Other adverse effects included increases in the number of stillbirths, spontaneous abortions, and increased infant mortality.
- Animal studies have reported increased incidence of foetal deaths and decreased fertility, live litter size, foetal body weight, and neonatal survival following inhalation exposure to methyl isocyanate during pregnancy.

Cancer Risk

- No information is available on the carcinogenic effects of methyl isocyanate in humans.
- In a study in which animals were exposed once by inhalation, no tumours were significantly associated with methyl isocyanate exposure in mice and female rats; male rats had marginally increased rates of tumours of the pancreas. (2)
- EPA has classified methyl isocyanate as a Group D, not classifiable as to human carcinogenicity. (1)

SAFETY [6]

First Aid Measures

Respiratory distress/asthma: If the person is experiencing difficulty in breathing, the following steps should be followed as this condition may develop rapidly into a life-threatening situation:

- Remove the patient from the contaminated area and give them oxygen.
- If breathing has stopped, initiate artificial respiration.
- If first aid or nursing personnel are present and have received appropriate training, they may administer a bronchodilating drug such as salbutamol by nebuliser.
- Seek medical attention urgently.

Splashes of isocyanate into eyes: Gently irrigate the eyes with a continuous stream of tepid water for at least 15 minutes. If contact lenses are worn, then irrigate the eyes thoroughly for a few minutes, remove the contact lenses and then continue with further eye irrigation. Refer the patient to a doctor or hospital.

CHEMWATCH
Bulletin Board
Hazard Alert
MAR. 05, 2021

Splashes onto skin: Remove contaminated clothing. Wash skin thoroughly with soap and water. Solvents, for example, methylene chloride, should not be used to remove isocyanates or polyurethane from the skin. Clothing should not be re-used until it has been decontaminated.

Control Measures

Where there is a likelihood of worker exposure to isocyanates, steps should be taken to minimise that exposure. A thorough examination of work practices is essential. Procedures should be adopted to ensure that workers are not exposed to an extent likely to cause adverse health effects. Control measures include, but are not limited to, the following, which are ranked in priority of their effectiveness:

- Elimination/substitution and process modification
- Engineering controls
- Administrative controls
- Use of personal protective equipment (PPE)

Engineering Controls

- Enclosure: All processes in which isocyanates are used should be enclosed wherever possible. Total enclosure, accompanied by good general ventilation, should be used to keep atmospheric concentrations below the relevant exposure standards.
- Local exhaust ventilation: If total enclosure of the process is not feasible, local exhaust ventilation may be necessary. Local exhaust ventilation is essential where TDI or HDI is used or where isocyanate or polyurethane is sprayed. Where other isocyanates or pre-polymers are used and aerosol formation cannot occur, local exhaust ventilation may not be necessary if the atmospheric concentration can be kept below the relevant exposure standards. Where local exhaust ventilation is installed, exhaust vapours should not be vented to the exterior in such a manner as to create a hazard.

Personal Protective Equipment (PPE)

In certain circumstances, personal protection of the individual employee is necessary. Personal protective devices should be regarded as being supplementary to substitution and engineering control and should not be used in preference to them as they do nothing to eliminate the hazard. However, in some situations, minimising exposure to isocyanates by enclosure and ventilation is not possible, particularly during on-site mixing of paints, spray-painting, foaming and maintenance of machine

and ventilation systems. In these situations, air-line respirators or self-contained breathing apparatus complying with Australian Standard AS 1716 must be

used. The selection, use and maintenance of personal respiratory protective devices should be in accordance with the requirements of Australian Standard AS 1715. Organic vapour respirators with particulate pre-filters and powered, air-purifying respirators are not suitable. Personal protective equipment must be appropriately selected, individually fitted and workers trained in their correct use and maintenance. Personal protective equipment must be regularly checked and maintained to ensure that the worker is being protected. Air-line respirators or self-contained breathing apparatus complying with Australian Standard AS 1716 should be used during the clean-up of spills and the repair or clean-up of contaminated equipment and similar situations which cause emergency exposures to hazardous atmospheric concentrations of isocyanate. Eye and skin contact with isocyanates should be avoided. Particular attention should be given to personal protective equipment being resistant to isocyanates, for example, Teflon, Viton, nitrile rubber and some PVA gloves. Protective gloves and overalls should be worn as specified in Australian Standard AS 2161. Contaminated garments should be removed promptly and should not be re-used until they have been decontaminated.

REGULATION [7,8]

United States

OSHA: The United States Occupational Safety & Health Administration has set the following Permissible Exposure Limit (PEL) for methyl isocyanate:

- **General Industry:** 0.02 ppm, 0.05 mg/m^3 (Skin)
- **Construction Industry:** 0.02 ppm, 0.05 mg/m^3 TWA (Skin)

ACGIH: The American Conference of Governmental Industrial Hygienists set a Threshold Limit Value (TLV) for methyl isocyanate of 0.02 ppm, 0.047 mg/m^3 TWA (Skin)

NIOSH: The **National Institute for Occupational Safety and Health has set a Recommended Exposure Limit (REL)for methyl isocyanate of** 0.02 ppm TWA (Skin)

CHEMWATCH
Bulletin Board
Hazard Alert
MAR. 05, 2021

Australia

Safe Work Australia: Safe Work Australia has established an 8-hour Time Weighted Average concentration for methyl isocyanate of 0.02 mg/m^3.

REFERENCES

1. http://en.wikipedia.org/wiki/Methyl_isocyanate
2. http://apps.sepa.org.uk/spripa/Pages/SubstanceInformation.aspx?pid=69
3. http://www.atsdr.cdc.gov/toxfaqs/tf.asp?id=629&tid=116
4. http://www.atsdr.cdc.gov/MMG/MMG.asp?id=628&tid=116
5. http://www.epa.gov/ttn/atw/hlthef/methylis.html
6. http://www.safeworkaustralia.gov.au/sites/SWA/about/Publications/Documents/514/Isocyanates.pdf
7. https://www.osha.gov/dts/chemicalsampling/data/CH_254200.html
8. http://www.safeworkaustralia.gov.au/sites/swa/about/Publications/Documents/772/Workplace-exposure-standards-for-airborne-contaminants.docx

Humble dung beetles may be ideal DNA detectors for animal surveys

2021-02-19

Biologists wanting to identify the resident creatures of a location, be it nearby woods or a distant mountainside, could soon have new assistants to help them vacuum up a surrounding's DNA: dung beetles. The guts of these unfussy eaters contain species-identifying mammalian DNA, a study has found, and could provide an easy, low-tech way to catalog regional biodiversity.

Using insects to sample biodiversity is "a super idea," says Elizabeth Hadly, an environmental biologist at Stanford University who was not involved in the study. "Dung beetles are everywhere."

Attempts to figure out a region's biodiversity through environmental DNA (eDNA) samples are only a few decades old. Scientists sift through dirt, soil, and especially water to find loose skin flakes, mucus, and other body fluids; then, they screen these for traces of identifiable DNA to determine which animals live in the region. So far, marine science has been the biggest beneficiary of eDNA techniques, also known as DNA barcoding. DNA can persist in water for several days, allowing scientists to simply filter samples from, say, a pond to get a rough estimate of which species are present.

It's much easier to filter large amounts of water for DNA than it is dirt or soil, so the use of eDNA on solid ground is rarer. Some scientists have scoured the blood in the guts of mosquitoes and leeches to find the DNA of their hosts. But leeches' range is limited, and in certain situations—like when lots of humans are around—mosquitoes can be hard to trap.

Rosie Drinkwater, a molecular biologist and postdoc at Queen Mary University of London, decided to test another widespread connoisseur of DNA-rich body material: the dung beetle. These invertebrates, which comprise thousands of different species within the family Scarabaeidae, feed on other animals' feces. There are dung beetles on every continent except Antarctica, and they make their homes in environments from deserts to forests to oil palm plantations, Drinkwater says.

She and colleagues set up baited traps to catch dung beetles in a forest on Borneo, where Drinkwater has been studying leeches for several years. Their lure? "The most reliable source of dung is from your fellow humans," Drinkwater says. "All in the name of science." Over 24 hours, the researchers trapped 24 thumb-size dung beetles of the genus Catharsius. Researchers

"Dung beetles are everywhere."

CHEMWATCH
Bulletin Board
Gossip
MAR. 05, 2021

dissected the beetles at a sterile field site and sent their guts to be analyzed at a laboratory at Queen Mary.

After sequencing the DNA inside the guts, they compared it with the genomes of animals known to live in the Bornean forests. DNA sequences solidly matched the bearded pig, sambar deer, muntjac (a type of deer), mousedeer, and porcupine, all animals common to the area, the researchers reported on 10 February in a paper posted to the bioRxiv preprint server. They also detected DNA from a rarer banded civet, but the sequences weren't clear enough to confidently identify it. Finally, they detected plenty of human DNA not belonging to the provider of the "bait"; most of it likely came from people working in logging and palm oil harvesting operations nearby. Taken together, the results suggest the technique could indeed be used in eDNA screening elsewhere.

Dung passes through dung beetles relatively quickly, within about 48 hours. Although that's a short window of opportunity, Drinkwater explains, it has an upside: If you get a dung beetle–gut DNA hit on a species, you can be relatively certain that animal was nearby recently.

Drinkwater cautions that the study has not yet undergone peer review, and more work is needed to test the strategy in different environments and using different beetles. Still, "Dung beetles are a smart addition to the arsenal" of eDNA tools, says Michael Kinnison, an evolutionary biologist and ecologist at the University of Maine, Orono.

Hadly agrees, but she's less enthusiastic about the unpleasant fate met by these six-legged citizen scientists. "Sacrificing a lot of dung beetles to subsample their guts … seems unnecessary," she says, adding she would prefer greater investment in nonlethal techniques such as sampling soils and sediments. "However, for particular questions this might be an opportune approach."

sciencemag.org, 19 February 2021

https://www.sciencemag.org

Of 180 birds examined by the scientists, 179 were shot with lead.

Most pheasants sold for food 'contain lead shot'

2021-02-25

Almost all pheasants sold for food in the UK contain toxic lead shot, scientists have found.

The discovery comes one year into a five-year transition to non-toxic shotgun ammunition - a move backed by nine UK shooting organisations.

Of 180 birds examined by the scientists, 179 were shot with lead.

One shooting group said finding humane and effective alternatives to lead would take time.

'No detectable impact'

The team, consisting of scientists and conservationists based across England and Scotland, bought wild-shot common pheasants that were sold by game dealers, butchers and supermarkets around the UK.

With labs closed in lockdown, the scientists carried out the pheasant dissections in their own kitchens.

"We took out the shot and sent it off for analysis and 99% of the ammunition we extracted was lead," said Prof Debbie Pain, from Cambridge University.

"So really that hasn't declined at all since the shooting organisations signed up to the voluntary ban."

That voluntary ban was a declaration in February 2020 by shooting and countryside organisations, which all committed to phasing out lead shot and transitioning "completely" to non-toxic alternatives. Those alternatives are already widely available and include steel, bismuth and tungsten.

That commitment, the scientists conclude, has not yet had any detectable impact.

Lead is toxic even at very low concentrations, as Prof Rhys Green from Cambridge University explained.

"Over time, it has been banned from a progressively lengthening list of products, including plumbing, paints on things like children's toys and as an additive to petrol. And the maximum allowable concentration of lead in many foods has also been limited by an EU directive, which still applies in the UK," he said.

"But game meat products are not included on that list of foods, for reasons that are unclear. Currently, the amount of lead in game meat sold for human consumption is not regulated by law."

Lead shot also builds up in the environment.

"When lead is shot into wildlife, it can be eaten by predators like scavenging birds," Prof Pain explained. "And a lot of lead gunshot falls into

CHEMWATCH
Bulletin Board
Gossip
MAR. 05, 2021

the environment and it can then be eaten by wildfowl and terrestrial birds and cause poisoning."

media captionDanish hunter Niels Kanstrup explains why he believes lead shot is a "poison for hunting"

The evidence about lead in the environment has led to an EU-wide ban on the use of lead shot over wetlands. But, because that restriction did not enter into force before the end of the Brexit transition period, it will not apply in the UK.

The British Association for Shooting and Conservation (Basc), which previously argued against any change in the rules on lead ammunition, now supports the voluntary transition, but told the BBC that "change is difficult" and would take time.

"Lead shot is the traditional ammunition for live quarry shooting - it has been for generations," said Steve Bloomfield from Basc. "[Our members] have to take time to try the alternatives - and those alternatives have to be effective and humane."

In Denmark, hunters have had to use those alternatives since 1996, when lead shot was banned for all hunting.

Prof Green said he hoped these findings would speed up the move away from lead shot.

"I hope, within a few years, lead shotgun ammunition is not being used at all for game shooting in the UK," he told BBC News.

"I have an open mind on whether this can be achieved through voluntary change or requires a government ban, but the evidence so far indicates that the voluntary approach needs to step up its effectiveness dramatically if it is to remain credible."

bbc.com, 25 February 2021

https://www.bbc.com

Why the Government controls the color of our food

2021-02-27

Many Americans might find it surprising that, in many instances, the colors of certain foods exist as they are because the government said so. The juicy oranges grabbed from the supermarket might not have been actually

The culture of dyeing foods particular colors in America dates back to an age-old battle between butter and margarine.

orange when they were picked from the tree and instead could have been a shade of green when fully ripe.

The culture of dyeing foods particular colors in America dates back to an age-old battle between butter and margarine.

Butter vs. Margarine

Butter was a hot commodity in the 1860s. Expensive and easily perishable, there was a need for an alternative. At the end of the decade, French chemist Hippolyte Mège-Mouriès created a blend of animal fat, milk, and salt that could stand up against butter and took much longer to spoil. The butter substitute was flying off of American supermarket shelves just as fast as the product arrived in the country in 1870.

There was one issue, however. Margarine in its natural state looked like lard, but manufacturers wanted to compete with butter, so they began to color it yellow. Dairy farmers and butter manufacturers already were not fans of the substitute as they watched it cut into their business, and, as a result, a barrage of anti-margarine ads popped up.

The federal government somewhat obliged the U.S. dairy industry by passing the Oleomargarine Act in 1886. Now, margarine manufacturers could still produce a yellow-dyed product, but there was a 2 cent per pound tax imposed on the butter substitute. It's one of the first recorded instances of American businesses using government intervention to stop competition.

The butter industry pursued more regulations, and by the end of the century, more than two dozen states enacted their own regulations on food color. The federal government also bumped the tax on yellow margarine up to 10 cents per pound. To bypass this, factories began using oil to naturally color margarine or including yellow dye capsules in packaging so people could mix their own margarine color at home.

Feds Weed Out Harmful Dyes

The idea of changing or enhancing the color of food was taking off, but by 1906 the federal government passed the Food and Drugs Act, banning the use of harmful food coloring or additives to conceal damaged or inferior products unless it was labeled as such. Seven colors were deemed safe for consumption, including an array of blues, yellows, and greens, although other colorings could be used as long as they appeared on the label. Today, there are nine approved colors.

CHEMWATCH
Bulletin Board
Gossip
MAR. 05, 2021

In the early 1900s, the USDA also began grading food on the quality of its appearance.

"If we don't use coloring in our food products to look a lot different than they look, it may affect people's decision whether to buy a food product or not," explained Michael Roberts, executive director at Resnick Center for Food Law and Policy.

As more food makers tinkered with colors, there was a quest to root out harmful substances and around 1937 the Food and Drug Administration moved to enact the Food, Drug, and Cosmetic Act after the deaths of more than 100 people, including children, in a medical mishap involving an elixir meant to cure various illnesses. The new law wasn't just a crackdown on the medical industry; food manufacturers now were only allowed by law to incorporate certified food coloring into products.

Use of Synthetic Food Color Is Fading

Now, think back to that orange you had for breakfast this morning. Thanks to the FDA it is some shade of orange — but, it may not have always been that way.

In warmer locales, typically closer to the equator, ripe oranges are actually green. Most Americans are accustomed to eating orange oranges, so farmers in some states like Florida and Texas may dye or manipulate the fruit's skin to the bright, glowing shade so popular in supermarket displays. However, states like California and Arizona have banned the practice.

Some of your other favorite food items may also be hiding behind dyes, including microwave popcorn, yogurt, chewing gum, and fish like salmon.

"Fish is a huge problem when it comes to deception. You've got fish that's caught in Alaska for example, sent to Asia for manipulation, sent back to Alaska, and then sent to the States for consumption in sushi bars," Resnick Center's Roberts said.

Today, the use of food dyes is on a decline. With healthy eating options remaining a priority for both consumers and manufacturers, companies are looking for more natural alternatives, while safety standards allow for some wiggle room.

"The standard the government uses is a reasonable [safety] standard," said Roberts. "So they don't have to be foolproof, 100 percent proven safe, but they have to be shown to be reasonably safe. So, we allow these little

exceptions to the 100 percent rule, no-risk rule, in order to accommodate a modern food system of having foods that are manufactured in different colors and taste in a variety of foods. The problem with that is beyond just the questions of deception and safety is the question of, is this the kind of food system we want.

cheddar.com, 27 February 2021

https://www.cheddar.com

Snakes insert their heads into living frogs' bodies to swallow their organs (because nature is horrifying)

2021-02-27

For knife-toothed kukri snakes, the tastiest parts of a frog are its organs, preferably sliced out of the body cavity and eaten while the frog is still alive. After observing this grisly habit for the first time in Thailand, scientists have spotted two more kukri snake species that feast on the organs of living frogs and toads.

The new (and gory) observations suggested that this behavior is more widespread in this snake group than expected. Two snakes also eventually swallowed their prey whole, raising new questions about why they would extract the living animals' organs first.

The scientists documented a Taiwanese kukri snake (Oligodon formosanus) and an ocellated kukri snake (Oligodon ocellatus) pursuing amphibian organ meals, tearing open frogs' and toads' abdomens and burying their heads inside, according to the studies. O. formosanus would even perform "death rolls" while clutching its prey, perhaps to shake the organs loose. As the snakes swallowed the organs one by one, the amphibians were still alive. Sometimes, the process would take hours, the researchers reported.PLAY SOUND

There are 83 species of kukri snakes in the Oligodon genus in Asia. The snakes typically measure no more than 3 feet (100 centimeters) long, and the group's name comes from the kukri, a curved machete from Nepal, as its shape is reminiscent of the snakes' large, highly modified rear teeth. Kukri snakes use these teeth for slicing into eggs, but they can also be formidable slashing weapons (as some very unfortunate frogs have discovered).

In one study, published Feb. 15 in the journal Herpetozoa, scientists described three snake attacks on rotund banded bullfrogs (Kaloula

As the snakes swallowed the organs one by one, the amphibians were still alive.

CHEMWATCH
Bulletin Board
Gossip
MAR. 05, 2021

pulchra), which are so round that they are also known as bubble frogs or chubby frogs. They have brown backs with lighter stripes down their sides and cream-colored stomachs, and they measure up to 3 inches (8 cm) long, according to Thai National Parks.

Two of the attacks were by Taiwanese kukri snakes, and took place in Hong Kong in October 2020. One snake, filmed on Oct. 2 in a residential neighborhood garden, emerged from a hole in the ground to bite a passing bubble frog, slicing open the frog and stuffing its head inside. Snake and frog tussled for about 40 minutes; the snake performed about 15 body rotations, or "death rolls," during the battle, according to the study.

"We believe that the purpose of these death rolls was to tear out organs to be subsequently swallowed," Henrik Bringsøe, lead author of both studies and an amateur herpetologist and naturalist, said in a statement.

A second Taiwanese kukri snake was discovered on Oct. 8 in an urban park while "energetically" dining on a frog's organs that were "exposed and visible," the study authors wrote.

The third attack on a bubble frog was by a small-banded kukri snake — the species that was first documented exhibiting this behavior — on Sept. 15, at a factory site outside a small village in northeastern Thailand. During the struggle, the snake performed 11 death rolls, its teeth buried firmly in the frog's belly.

"The snake's efforts resulted in its teeth penetrating the abdomen to such an extent that blood and possibly some organ tissue appeared," the scientists reported. "Eventually, the frog was swallowed whole while still alive."

Another study, published on the same day in Herpetozoa, presented an observation of an ocellated kukri snake feasting on an Asian common toad (Duttaphrynus melanostictus) inside a lodge in a national park in southern Vietnam. These toads are stout, thick-skinned and variably colored, and they measure about 3 inches (8.5 cm) long, according to Animal Diversity Web, a biodiversity database maintained by the University of Michigan's Museum of Zoology.

Observers recorded this attack on May 31, 2020. The toad was already dead at the time, "and the snake was moving its head and neck side to side as if trying to work its way inside," the study authors wrote. Minutes later, the snake gulped down the toad whole.

In the 2020 study about small-banded kukri snakes eviscerating Asian common toads, the scientists hypothesized that the snakes selectively ate the organs to avoid the toads' deadly toxins. However, the ocellated kukri snake swallowed the toad after its organ appetizer, hinting that the snakes might have some natural resistance to the toads' poison.

Chubby frogs also have a built-in deterrent that may encourage predators to go straight for their organs. While the frogs aren't toxic, they defensively secrete a sticky mucous that has an unpleasant taste, according to the University of California, Berkeley's AmphibiaWeb.

"We hope that future observations may uncover additional aspects of the fascinating feeding habits of kukri snakes — though we may indeed call them gruesome!" Bringsøe said in the statement.

Originally published on Live Science.

livescience.com, 27 February 2021

https://www.livescience.com

A mountain lizard in Peru broke the reptilian altitude record

2021-02-23

The Andean lizard breaks the old record by 100 meters.

High in the Peruvian Andes, a lizard has claimed the title of world's highest altitude reptile. The lizard was spotted as high as 5,400 meters in elevation, exposed to frigid temperatures, intense ultraviolet radiation and low oxygen, researchers report February 15 in Herpetozoa.

In October 2020, zoologist José Cerdeña and colleagues ascended Peru's Chachani volcano, which rises 6,057 meters above sea level. The team was looking for Liolaemus lizards, also known as tree iguanas, and found them as the researchers climbed above 5,000 meters.

"We observed something moving between the rocks," says Cerdeña, of the National University of Saint Augustine in Arequipa, Peru. "At first we thought they were mice." After getting a closer look, he and his team saw that the darting animals were actually lizards, tentatively identified as Liolaemus tacnae. The species is known to survive at high altitude areas in Peru, and at least one population near Chachani was previously spotted some 4,000 meters above sea level.

Survival in such forbidding conditions is hard enough for mammals (SN: 7/29/20). But cold-blooded reptiles face additional temperature regulation

CHEMWATCH
Bulletin Board
Gossip
MAR. 05, 2021

obstacles, so records of reptiles this high are rare. Until now, the highest living reptile was a cold-hardy species of toad-headed agama lizard (Phrynocephalus erythrurus) living on the Tibetan Plateau at 5,300 meters. The Andean lizard breaks the old record by 100 meters.

It's somewhat fitting that the record goes to a species of Liolaemus lizard. The genus is exceptionally diverse, with more than 270 species adapted to a wide range of habitats all over South America.

Climate change could have facilitated Liolaemus' status as a record holder, Cerdeña notes, as colder conditions have retreated up mountain peaks in the face of warming. "It is possible that this lizard species began to colonize this altitude recently," he says.

The research group's next steps are to verify the identification of the lizard with physical and genetic analysis, Cerdeña says. He also wants to know more about the reptile's physiology, which may hold secrets to its high-altitude lifestyle.

sciencenews.org, 23 February 2021

https://www.sciencenews.org

70,000 never-before-seen viruses found in the human gut

2021-02-25

Yet shockingly little is known about the microbiome

Scientists have identified more than 70,000 previously unknown viruses that live in the human gut and infect the bacteria that live there — but how they impact our bodies is a mystery.

The gut microbiome, or the community of microbes that we carry around in our digestive system, plays an important role in food digestion and regulating the immune system, Live Science previously reported. But many studies have also linked imbalances in gut microbes to conditions including liver disease, obesity and allergies.

Yet shockingly little is known about the microbiome. Although the microbiome includes a variety of microorganisms — including bacteria and viruses — previous studies have focused mainly on gut bacteria because they are easier to detect. PLAY SOUND

In the new study, a group of researchers used a method called metagenomics to identify the viruses. This method involves analyzing all of the genetic material from a community of microbes together and

then mapping the individual sequences found to specific species. They analyzed more than 28,000 gut microbiome samples taken from 28 countries.

This process revealed complete genomes for more than 140,000 species of viruses living in the human gut. (A single person, however, carries around only a fraction of these species.) Though many types of viruses live in the gut, they focused on viruses that can infect bacteria, called "bacteriophages" or "phages" for short.

The researchers limited their scope to bacteriophages because "we are still figuring out their role in human health," said lead author Luis Camarillo-Guerrero, a recent PhD graduate from the Wellcome Sanger Institute in the U.K. "It's probably safe to say that the vast majority of them are not harmful to us and are simply an integral component of our body microbiota."

Phages may play a central role in the gut microbiome — for instance, by providing their bacterial hosts with advantageous traits and influencing how those bacteria evolve.

"As bacterial communities are a critical component of our gut, it's not difficult to imagine that phages could be paying a key role in maintaining a healthy equilibrium in our intestine," Camarillo-Guerrero told Live Science in an email. However, there are known cases when phages have contributed to disease; for example, both diphtheria, a serious bacterial infection, and botulism, a serious illness that attacks the body's nerves, are caused by toxins that are encoded by phage genes.

They published the genomes of these bacteria-invading viruses in a new database they created called the "Gut Phage Database," which can be used to guide further studies on these viruses, Camarillo-Guerrero said. "A genome is like the blueprint of an organism," he said. "The amount of information that we can extract from knowing only the DNA sequence of an organism is very large."

The findings were published Feb. 18 in the journal Cell.

Originally published on Live Science.

livescience.com, 25 February 2021

https://www.livescience.com

CHEMWATCH
Bulletin Board
Gossip
MAR. 05, 2021

Overgrown sheep 'Baarack' gets epic quarantine haircut, loses 78 lbs. of matted wool

2021-02-27

Months of social distancing to slow the spread of COVID-19 have kept many people from getting regular haircuts. But even the most overgrown stay-at-home hair can't compare with the plight of a merino sheep in Australia wearing a whopping 78 lbs. (35 kilograms) of overgrown, matted fleece.

Domesticated sheep usually undergo annual shearings to keep their coats in check. However, this particular ram, nicknamed Baarack, was roaming wild in a state forest in Victoria, Australia. He hadn't been shorn in years, and his fleece had grown into a dense, gargantuan mass by the time he was captured and brought to Edgar's Mission Farm Sanctuary for rescued farm animals in Lancefield, Victoria, a representative of the nonprofit told Live Science in an email.

There, Baarack was finally shorn of his heavy, woolly burden, which weighed about as much as a 10-year-old child. Under the pounds of matted wool — stained with dirt, studded with twigs and crawling with insects — "was not Australia's answer to the yeti, but a sheep," Edgar's Mission wrote on Facebook on Feb. 10.

However, this particular ram, nicknamed Baarack, was roaming wild in a state forest in Victoria, Australia.

At one point in the past, Baarack had an owner, as he had been castrated and mulesed — a practice that removes skin from around a sheep's tail, creating smooth scar tissue that deters blowflies, according to Australia's Royal Society for the Prevention of Cruelty to Animals (RSPCA). His ears also showed signs of tagging, though the tags were long gone, possibly torn out by the weight of his overgrown coat, according to Edgar's Mission.

Photos of Baarack before his haircut show the sheep's muzzle poking out of an enormous and very crusty wool cocoon. When the sheep was standing, only his hooves and a small section of his lower legs were visible; when he lay down, his legs disappeared entirely.

The load of wool around his head was so heavy that it partly hid his face, and the fleece's weight pulled on his lower eyelids, exposing his eyes to grit and dust. He had a painful ulcer in one eye from a stuck grass seed, according to the mission representative.

Evidence from mitochondrial DNA — which comes from a separate genome inside mitochondria, or energy-making cells — in wild and modern sheep indicates that domesticated sheep are descended from the

mouflon (Ovis orientalis), and their domestication began around 11,000 years ago in the Fertile Crescent, researchers reported in 2018 in the Eurasian Journal of Applied Biotechnology. Over thousands of years, sheep were selectively bred to produce wool for human use, and domesticated sheep no longer shed their coats seasonally, as their wild relatives do.

Left unshorn, their woolly coats continue to grow. Overgrown coats create health hazards for the sheep, making them prone to injury and infections, and hampering the animals' ability to regulate their body temperature, according to North Dakota State University.

In 2015, an overgrown merino sheep named Chris (also in Australia) set a record for having the most wool removed in one shearing, shedding more than 90 lbs. (41 kg) of matted fleece, Live Science previously reported. RSPCA staff rescued Chris from the wild; they estimated that Chris hadn't been shorn in at least five years.

The amount of wool removed from Baarack would be enough to knit about 61 sweaters or 490 pairs of men's socks, The Guardian reported on Feb. 24.

Now that the beleaguered Baarack doesn't have to peer through a curtain of matted, crusty fleece, his future definitely looks a lot brighter. And with rescue workers at Edgar's Mission nursing the underweight sheep back to health, all's wool that ends wool.

Originally published on Live Science.

livescienc.com, 27 February 2021

https://www.livescience.com

It's not just oceans: scientists find plastic is also polluting the air

2021-02-26

Plastic waste in our oceans is now a well-known issue but new data shows that plastic is adding to air pollution in Indian cities too.

For several years scientists were puzzled why Delhi was more susceptible to thick smogs than other polluted cities such as Beijing. New research links this to tiny chloride particles in the air that help water droplets to form. Globally, chloride particles are mainly found close to coasts, due to sea spray, but the air in Delhi and over inland India contains much more than expected.

For several years scientists were puzzled why Delhi was more susceptible to thick smogs than other polluted cities such as Beijing.

CHEMWATCH
Bulletin Board
Gossip
MAR. 05, 2021

At first, the sources were thought to be illegal factory units around Delhi that recycle electronics and those that use strong hydrochloric acid to clean and process metals. These are certainly part of the problem, but new measurements have revealed another source.

Researchers looked at the other pollutants that increased at the same time as the chloride particles. This chemical fingerprint matched the burning of household waste containing plastics and the burning of plastics themselves. These large amounts of chloride are estimated to be responsible for around half of Delhi's smog events.

In low-income countries about 90% of waste ends up in open dumps or is burned in the open air. If you set fire to plastic, it rapidly reveals its origins as an oil-based product by producing copious amounts of black smoke. Using data on the contents of rubbish from around the world, researchers from London's King's and Imperial Colleges have estimated that the soot from open waste burning has a global warming impact equivalent to between 2% and 10% of the global emissions of carbon dioxide.

Burning plastics also produces large amounts of dioxins and other highly toxic pollutants that can persist in the food chain. Modern waste incinerators in the UK and Europe go to great lengths to reduce these toxic emissions but there are no protections when waste is burned at home or in the open.

The waste burning problems in Indian cities do not end there. As James Allan from the University of Manchester, who took part in the latest Indian study, explained, the extra chloride could be promoting chemical reactions between different air pollutants. This includes adding to the ground-level ozone across India. Already this is estimated to reduce yields of some Indian crops by 20% to 30%.

Better waste management needs to be a priority but eliminating plastic pollution also requires a rethink of global plastic production and use.

theguardian.com, 26 February 2021

https://www.theguardian.com

A new laser-based random number generator is the fastest of its kind

2021-02-25

By normal standards, the design for a new laser is a total dud. Rather than producing a crisp, steady beam, the laser casts a fuzzy patch of light full

But to a team of physicists, the laser's messy output is its greatest asset.

of randomly flickering speckles of brightness. But to a team of physicists, the laser's messy output is its greatest asset. The chaotic fluctuations in the laser's light can be translated into 254 trillion random digits per second — more than 100 times faster than other laser-powered random number generators, researchers report in the Feb. 26 Science.

"This is a marvelous step" toward more efficient random number generation, says Rajarshi Roy, a physicist at the University of Maryland in College Park who was not involved in the work.

Random number generators are valuable tools in computing (SN: 5/27/16). They are used to create encryption keys that scramble private data, such as passwords and credit card numbers, so that information can travel securely over the internet. Computer simulations of complex systems, such as Earth's climate or the stock market, also require many random numbers to properly capture chance occurrences that happen in real life.

Lasers can generate random number sequences thanks to tiny, naturally occurring fluctuations in the light's frequency over time. But using a laser beam to produce random numbers like that is sort of like repeatedly rolling a single die. To generate many strings of random digits from a single laser at once, physicist Hui Cao of Yale University and colleagues came up with a new design.

In the team's laser, light bounces between mirrors positioned at either end of an hourglass-shaped cavity before exiting the device. This irregular shape allows light waves of various frequencies to ricochet through the laser and overlap with each other. As a result, when the laser is shined on a surface, its light contains a constantly changing pattern of tiny pinpricks that brighten and dim randomly. The brightness at each spot in the pattern over time can be translated by a computer into a random series of ones and zeros.

Cao and her colleagues pointed the laser at a high-speed camera, which measured light intensity at 254 spots across the beam about every trillionth of a second. But that camera tracked the laser light for only a couple of nanoseconds before its memory filled up, after which the data were uploaded to a computer to be encoded as 0s and 1s, says Daniel Gauthier, a physicist at Ohio State University who cowrote a commentary on the study in the same issue of Science. To work in the real world, this random number generator would need to be outfitted with light detectors

CHEMWATCH
Bulletin Board
Gossip
MAR. 05, 2021

that could send rapid-fire brightness measurements to computers in real time.

sciencenews.org, 25 February 2021

https://www.sciencenews.org

How toxic is foam insulation

2021-02-24

Since industrialisation, chemicals have been rolled out without sufficient testing, resulting in dire consequences for humans, animals and the environment. Well-known examples include DDT (dichlorodiphenyltrichloroethane) and PCBs (polychlorinated biphenyls).

Now in the spotlight: Polymeric FR (PolyFR), a flame retardant for foam building insulation. Its production has ballooned out to 26,000 tonnes each year with little attention to its health and ecological impacts, according to a team led by Miriam Diamond from the University of Toronto, Canada.

Now in the spotlight: Polymeric FR (PolyFR), a flame retardant for foam building insulation.

Diamond is the lead author of a scientific opinion piece published in the journal Environmental Science & Technology, in collaboration with members of the Green Science Policy Institute in Berkeley, US, and others.

Heating and cooling buildings produces a substantial amount of greenhouse gas emissions, leading to increased awareness of the need for energy-efficient construction. Polystyrene foams provide good insulation and are light and cost-effective, and flame retardants are typically added to meet building flammability codes – but these don't have a great track record.

The PBT chemical flame retardant HBCDD (hexabromocyclododecane), used in buildings for decades, is toxic and has been found to accumulate in humans. It has largely been replaced with PolyFR.

Co-author Arlene Blum has long been tracking different types of chemical flame retardants and advocating for proper assessment of their potential for harm, explains Diamond. "I'm the scientist who finally took up her challenge," she says.

"Given past experiences, we believe that it is no longer acceptable to assume that a chemical is safe," she adds. "But this chemical, PolyFR, has received very little attention – because it's a polymer and insufficient testing has assessed its potential to break down."

Industry claims that PolyFR is safe. It's assumed that polymers are less risky than monomeric compounds, the authors explain, because they're larger and less likely to migrate into the environment where they can accumulate.

But according to Blum and Diamond, research has shown that it does contain or could break down into potentially harmful compounds under certain conditions.

Notably, PolyFR is made from butadiene and styrene, which are both carcinogens. Bromine is added to make it a flame retardant – and past analysis of such retardants has showed them to be harmful.

Diamond and colleagues outline several opportunities when people and ecosystems can be exposed to potentially toxic breakdown products as it is released into the environment during the foam's manufacture, installation and disposal.

While stressing the need for "rigorous toxicity and hazard assessments of PolyFR … under realistic scenarios across its lifecycle," they propose the use of naturally flame-resistant insulation materials such as glass-wool or stone-wool, which don't need flame retardants.

"Making buildings more energy-efficient is a key part of tackling the climate crisis," says Blum. "But we need to be careful not to create new health and environmental problems along the way. A 'green building' with potentially hazardous insulation isn't a green building at all."

cosmosmagazine.com, 24 February 2021

https://www.cosmosmagazine.com

CHEMWATCH
Bulletin Board

Count Down: Hormonal havoc in our midst

2021-02-24

The drop heard round the world

In late July 2017, it seemed as if every media outlet around the globe had become obsessed with the state of human sperm counts. Psychology Today cried, "Going, Going, Gone? Human Sperm Counts Are Plunging," while the BBC declared, "Sperm Count Drop Could Make Humans Extinct," and the Financial Times announced, "Urgent Wake-Up Call' for Male Health as Sperm Counts Plummet." A month later, Newsweek published a major cover story on the same subject: "Who's Killing America's Sperm?"

By the end of the year, my scientific paper "Temporal Trends in Sperm Count: A Systematic Review and Meta-Regression Analysis," which sparked these stories—and hundreds of others around the world— was ranked number 26 among all referenced scientific papers published worldwide, according to Altmetric's 2017 report. This truly was the drop heard round the world.

Chance of extinction?

These days, the world as we've known it feels as though it's changing at warp speed. The same could be said for the status of the human race. It's not only that sperm counts have plummeted by 50 percent in the last forty years; it's also that this alarming rate of decline could mean the human race will be unable to reproduce itself if the trend continues. As my study collaborator Hagai Levine, MD, asks, "What will happen in the future—will sperm count reach zero? Is there a chance that this decline would lead to extinction of the human species? Given the extinction of multiple species, often associated with man-made environmental disruption, this is certainly possible. Even if there is low probability for such a scenario, given the horrific implications, we have to do our best to prevent it."

This is especially worrisome because the sperm-count decline that's occurring in Western countries is unabating; it's steep, significant, and continuing, with no signs of tapering off. As Danish researcher and clinician Niels Skakkebaek, MD, who was the first person to alert the scientific community to the role of environmental factors in sperm decline, said, "It's an inconvenient message, but the species is under threat, and that should be a wake-up call to all of us. If this doesn't change in a generation, it is going to be an enormously different society for our grandchildren and their children."

"What will happen in the future—will sperm count reach zero? ["]

Indeed, if the decline continues at the same rate, by 2050 many couples will need to turn to technology— such as assisted reproduction, frozen embryos, even eggs and sperm that were recreated from other cells in the laboratory (yes, this is actually being one)—to reproduce.

A dystopian future?

Some of what we've been thinking of as fiction, from stories such as The Handmaid's Tale and Children of Men, is rapidly becoming reality. In the winter of 2017, I presented my sperm-decline findings at the One Health, One Planet conference, which focused on the interconnected health of different species on the planet, the damage being inflicted by our mad "industrialization" of the environment, and its devastating effects on frogs, birds, polar bears, and other species. After presenting the results of our analysis, which were shocking enough to the audience, I spoke for the first time about what sperm decline could mean for Homo Sapiens. That night, I awoke from a dream, feeling incredibly anxious as I suddenly realized the full implications of the story I'd put together— that given the declines in sperm count and testosterone levels and the increases in hormonally active chemicals that are being spewed into the environment, we really are in a dangerous situation for mankind and world fertility.

This was no longer only a matter of scientific study for me. I felt and remain genuinely scared by these findings on a personal level.

In some ways, the picture looks even worse when you delve deeper because it's not just an issue for men. Women, children, and other species are also having their reproductive development and function commandeered in a dysfunctional direction. In some countries throughout the world, including the United States, a massive sexual slump is underway, due to declines in people's sex drives and interest in sexual activity; men, including younger guys, are also experiencing greater rates of erectile dysfunction. In animals, there have been changes in mating behavior, with more reports of male turtles humping other male turtles, and female fish and frogs becoming masculinized after being exposed to certain chemicals.

CHEMWATCH
Bulletin Board
Curiosities
MAR. 05, 2021

Taken together, these trends are causing scientists and environmentalists to wonder, how and why could this be happening? The answer is complicated.

ehn.org, 24 February 2021

<u>https://www.ehn.org</a</u>>

I tested my tap water, household products and cat for toxic 'forever chemicals'

2021-02-24

After spending several months reporting on the PFAS crisis, I had an alarming realization: taco night might be poisoning me.

I learned that the type of nonstick pans that I used to fry the fish usually contain the toxic chemicals, also called per- and polyfluoroalkyl substances. Research alerted me to their use in some types of parchment paper, which I used to roll tortillas, while the aluminum foil in which I wrapped leftovers raised a red flag with its "nonstick" label. For dessert, I purchased cookies that a local bakery packed in the type of paper bags sometimes <a target="_blank" href="https://toxicfreefuture.org/new-study-finds-pfas-chemicals-in-takeout-food-packaging/"><u>treated</u> with PFAS, and the chemicals may have been in my tap water and fish.

But PFAS, dubbed "forever chemicals" because they don't naturally break down, aren't only lurking in the kitchen. The synthetic compounds are often used to make thousands of everyday products water, stain and grease resistant, and they're popular with manufacturers <u>across dozens of industries</u> because they're so effective. That's a problem because the class of about 4,700 compounds is<a target="_blank" href="http://www.c8sciencepanel.org/prob_link.html"><u> linked</u> to serious health problems like cancer, heart disease, birth defects, liver disease and decreased immunity.

The extent of PFAS contamination is only now coming into focus – <u>studies</u> have found drinking water supplies for well over 100 million people across demographic lines may be contaminated by the chemicals. It's <a target="_blank" href="https://www.niehs.nih.gov/health/topics/agents/pfc/index.cfm"><u>estimated</u> that they're present in 97% of Americans' blood, and public health advocates are just starting<u> to understand</u> how widespread their use is in everyday products.

Research has found that PFAS might also be in my dental floss, waterproof boots, umbrella, mattress pad, bike chain lube, cellphone, clothing, camping gear and more.

Research has found that PFAS might also be in my dental floss, waterproof boots, umbrella, mattress pad, bike chain lube, cellphone, clothing, camping gear and more. They're used in a <a target="_blank" href="https://pfasproject.com/2018/03/16/ewg-cosmetics-database-indicates-pfas-in-66-different-products-from-15-brands/"><u>range</u> of personal care products from moisturizer to bar soap to cosmetics by a number of brands. Meanwhile, my couch and carpet may have been treated with Scotchgard or other stain guards that use PFAS to make products stain resistant.

The more I dug into the chemicals' myriad uses, the more I found that I'm potentially exposed to them in nearly every facet of daily life in my house.

I soon began to scan my home for products that potentially contained them and anxiously wondered: "Am I being poisoned by a steady drip of PFAS?"

I set out to answer that question by checking dozens of household items, my tap water and blood samples from my cat, Ling Ling, and me for the chemicals. I sent the results to toxicologists and PFAS researchers who provided insight on what they mean and helped answer my question. The testing was performed by two independent laboratories that are among the few nationwide that can conduct such analyses.

Testing confirmed that my and Ling Ling's blood is contaminated with PFAS. The levels for several compounds are what Graham Peaslee, a University of Notre Dame PFAS researcher, called "unusually high" and at quantities at which toxicologists say they start seeing links to health problems. Some experts who reviewed the results said they believe a case that I am being slowly poisoned could be made, but they also cautioned that PFAS's presence in my blood doesn't necessarily mean I'll ever become sick.

And while testing indicated the chemicals' use in products throughout my home, it's unclear how they contributed to my blood's contamination, and the project often raised more questions than it answered.

The results and uncertainty are, in a word, distressing.

'They're coming from so many places'

Labs detected or I was able to confirm the chemicals' presence in 15 common products, and there are undoubtedly more in items that weren't checked. State regulators since 2018 have been monitoring drinking water

CHEMWATCH
Bulletin Board
Curiosities
MAR. 05, 2021

supplies and my tap water test came back clean, but it's possible that it has been contaminated in the past.

Blood tests revealed four types of PFAS compounds in my and Ling Ling's blood. They're among the most common used by industry, and three exceeded the median US blood levels for adult humans. That included PFHxS, which was measured in my blood at 2.7 nanograms per liter, and in Ling Ling's blood at about 13 nanograms per liter. The US median for humans is about one nanogram per liter.

Though the amount of PFAS in our blood is minuscule, the levels for each compound (except one) are above US medians, and that could present a health threat, said Erika Schreder, a toxicologist with Toxic Free Future. The Seattle-based non-profit studies PFAS contamination and pushes industry to find alternatives to the chemicals.

"Unfortunately, we do see that typical levels can be tied to certain health issues, like reduced immunity, so that is definitely a concern," Schreder said after reviewing my results.

Just as it's impossible to know how many cigarettes cause cancer, there's no clear level of exposure to PFAS that will <u>cause</u> <a target="_blank" href="https://www.atsdr.cdc.gov/pfas/health-effects/index.html"><u>health problems</u>. Ling Ling and I may still be exposed to the chemicals and I worry about what it could mean for us 10 or 20 years down the road. Carla Ng, a University of Pittsburgh researcher who models PFAS's bioaccumulation in organisms, called the persistent cultural misconception that exposure to chemicals isn't a problem if it doesn't immediately harm us "old-fashioned".

"We're understanding that a lot of the long-term chronic disease that people have can links back to these cumulative exposures over their lifetime," Ng added. "It's not just about keeping somebody from keeling over, it's about reducing the overall burden of environmentally associated diseases in the US population, which is pretty big."

While the lab results provide useful information, the chemicals' nature, and sheer ubiquity, gaps in testing capabilities and industry data make it nearly impossible to get an accurate read of how much PFAS are in our bodies. It's also difficult to connect the dots between the chemicals in my blood and home with any precision.

"It's the fact that PFAS are so pervasive," Ng said. "It's not just in electronics, healthcare products or consumer products – it's in all of those things,

which makes [the project] nearly impossible because they're coming from so many places."

Moreover, PFAS in my household goods today could show up in my water or dinner long after I discard them. The compounds used <u>during the manufacturing process</u> or when products containing PFAS are put in a landfill can eventually migrate to drinking water supplies and the <a target="_blank" href="https://www.sciencedirect.com/science/article/pii/S0160412018332069"><u>food chain</u>.

That also makes it difficult to draw a clear link between the compounds found in my blood and anything currently in my home, said Courtney Carignan, an environmental epidemiologist with <u>Michigan</u> State University. "There's the problem of a person's exposure in their home, and then there's the problem that [the chemicals were] ever made, and are getting into the environment … then can get into your fish later," she said. Industry regularly questions whether any of this is cause for concern. The PFAS and Scotchgard producer 3M acknowledges on its website "possible associations with certain biomarkers or health outcomes in people for PFOA and PFOS", referring to two older PFAS. However, in a statement, a spokesperson said that the "weight of scientific evidence from decades of research does not show that PFOS or PFOA causes harm in people at current or historical levels".

Products in my home that contain PFAS

Testing found items that contain PFAS from every room in my house, along with my garage and basement.

Most items were checked twice – once by Galbraith Laboratory, a Knoxville lab that's considered a leader in toxic chemical testing, and by Notre Dame's Peaslee, a professor of experimental nuclear physics, chemistry and biochemistry. The tests confirmed the presence of fluorine, which indicates PFAS, in my bike chain lube, several types of food packaging, a small mat treated with Scotchgard, waterproof boots, cookware and Oral B Glide dental floss.

The PFAS in these products can take several routes into my body, and may partly explain the elevated blood levels.

PFAS applied to products like a carpet, couch or waterproof clothing continually break off and are breathed in, or attach to dust that gets on our hands and is ingested. The chemicals can then accumulate in our organs

CHEMWATCH
Bulletin Board
Curiosities
MAR. 05, 2021

and could <a target="_blank" href="https://www.atsdr.cdc.gov/pfas/health-effects/index.html"><u>trigger</u> <u>disease</u>.

Toxic Free Future's Schreder said she visualizes the protective stain-resistant layer that PFAS form as a shag carpet. The pieces of shag repel water and stains, but, over time, the shag breaks off. "They can go up into the air, so then they're contaminating your indoor air in your home and you breathe them in," she said. "Then you convert them in your body into these highly persistent compounds."

Studies have <a target="_blank" href="https://pubs.acs.org/doi/10.1021/acs.estlett.9b00786"><u>found</u> pets like Ling Ling often have higher levels of PFAS in their blood than humans, partly because they're smaller, and partly because "if you're a toddler or a cat, then you spend a lot more time kind of interacting with house dust," Schreder said. Indeed, Ling Ling had higher levels of two compounds than I did.

In my house, my waterproof Sorel boots and the small mat in my basement that had been treated with Scotchgard put me at potential risk for this type of exposure. Researchers told me furniture, carpets and shoes treated with stain protectors like Scotchgard are a prevalent source of PFOS contamination in my house and Americans' blood, and that PFAS compound was found in my blood. Sorel didn't respond to requests for comment.

By some<u> estimates</u>, up to 90% of carpets on the market were treated with PFAS products until the industry <a target="_blank" href="https://saferchemicals.org/2019/09/17/the-home-depot-bans-toxic-pfas-in-carpets-and-rugs-it-sells/"><u>shifted away</u> from them last year. That followed proposals to <u>ban</u> PFAS-treated carpets in<a target="_blank" href="https://legislature.vermont.gov/bill/status/2022/H.26"><u> several states</u> and decisions by retailers like Home Depot and Lowe's to <u>stop selling</u> Scotchgard-treated carpets. The PFAS have been replaced by stain guards free of the chemicals.

Though Notre Dame's Peaslee didn't detect PFAS in my couch or a carpeted room, the chemicals can stay in our bodies for decades. Exposure to pieces of furniture that I owned before my current couch, which I bought two years ago, could be behind some of the PFAS levels in my and Ling Ling's blood, Schreder said.

Several experts who reviewed my tests were alarmed by the bike lube's levels, which were the highest of any product in the house. I get the liquid

on my hands during my monthly chain lubing, and "that is the kind of product that can lead to a lot of exposure", Schreder said.

In the kitchen, we confirmed that the parchment paper and nonstick pan used on taco night contained PFAS. We also found the chemicals in carryout packaging from several <a target="_blank" href="https://www.theguardian.com/us-news/detroit"><u>Detroit</u> restaurants.

The chemicals' use in food packaging is <u>widespread</u>. Some restaurants probably use at least some packaging that contains them, and some restaurateurs probably aren't aware. Molded fiber products, for example, categorically contained the chemicals until last year. When I spoke with Avalon International Breads about their cookie bags, Jackie Victor, a co-owner, said she was "shocked" to learn that they contained the chemicals, planned to immediately pull them, and would find an alternative that is PFAS-free. "We're victims, too," Victor told me.

Research shows that PFAS in food packaging <a target="_blank" href="https://www.foodpackagingforum.org/news/pfas-in-paper-packaging-and-factors-influencing-its-migration"><u>can</u> leach into food, and that increases with temperature, duration of contact and other factors, said Laurel Schaider, a PFAS researcher with the Silent Spring Institute. The non-profit studies the chemicals' use in the food industry and in 2017 <u>found</u> PFAS in nearly 50% of fast food wrappers that it tested. The chemicals it identified included PFHxS and PFOA, which were found in my blood.

Silent Spring later <a target="_blank" href="https://silentspring.org/news/people-who-eat-more-meals-home-have-lower-levels-harmful-pfas-chemicals-their-bodies"><u>analyzed</u> federal PFAS data and found a significant correlation between people who eat out and higher levels of the chemicals in their blood. "What we ate yesterday can stay in our bodies for years," Schaider said.

PFAS in our blood

Are the PFAS that are in my home responsible for the PFAS in my blood? Experts with whom I spoke say almost certainly, but this is where the picture gets especially fuzzy.

The California-based Vista Analytical Laboratory checked my and Ling Ling's blood for 24 compounds. In both of us it detected elevated levels of PFOA. The compound was commonly used to produce PTFE that was

CHEMWATCH
Bulletin Board
Curiosities
MAR. 05, 2021

applied to a wide range of consumer products, including the pan I used to fry the fish, bike lube, plumber's tape and dental floss.

In Ling Ling and me, the test found PFOS and PFHxS, which are constituents of firefighting foam, and the former was in Scotchgard until 2003. My blood also contains PFNA, which is used in the production of nonstick and stain-resistant coatings.

A tool developed by Carignan and Silent Spring shows how <u>my</u> and <a target="_blank" href="https://www-pfas.pfas-exchange.org/report/graphtool?tab=4"><u>Ling Ling's</u> levels compare with those of adult humans living in the US.

While some of the chemicals are probably present in products in my home, Galbraith's test tells us how much fluorine is in the items, but doesn't identify individual PFAS compounds.

Experts with whom I spoke said it was also possible that the chemicals are in our food, especially <u>fish</u>, which Ling Ling and I regularly eat. PFAS are also turning up in livestock and crops via <a target="_blank" href="https://www.epa.gov/newsreleases/epa-takes-action-investigate-pfas-contamination"><u>pesticides</u>, <u>contaminated sewage sludge</u> used as fertilizer, and contaminated water used on farms.

In the US, industry is replacing the older, longer compounds with a newer generation of PFAS that it claims are safer, though that claim is contradicted by a growing body of <a target="_blank" href="https://www.publicsource.org/pitt-scientist-toxic-pfas-4000-chemical-contamination/"><u>research</u>. Testing didn't find those chemicals in my blood, but that doesn't mean they aren't in Ling Ling and me.

Ng said commercial labs didn't have the ability or analytical standards to check our blood for more than about 40 PFAS compounds, but thousands exist.

This unknown adds extra layers of anxiety and leaves me wondering if I should run to my doctor for a cancer screening or liver check. It's possible the chemicals are <u>behind</u> my <a target="_blank" href="https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7071576/"><u>high cholesterol</u>, though the cookies and milkshakes that are part of my weekly diet could be driving it.

Most companies that I contacted for comment didn't respond. Procter and Gamble, which uses PTFE in its Oral B Glide dental floss, stated that Oral B tested negative for the presence of PFAS, and claimed PTFE isn't PFAS.

Chemical companies have recently begun making that <u>claim</u>, and argue that it's safer because it does not necessarily accumulate in the body in the same way as other such compounds.

But experts who spoke with me say there isn't enough independent science to determine whether PTFE is safe or not. PTFE has also generally been considered a PFAS compound, and the EPA <a target="_blank" href="https://www.epa.gov/sites/production/files/2018-09/documents/final_epa_pfas_leavenworth_kansas_presentations_september_5_2018.pdf"><u>classifies it as such</u>. Moreover, Ng noted that other PFAS compounds are used in PTFE production, which she said is a concern.

Procter and Gamble also said in the statement that it tested its floss using a modified version of the <u>EPA 537 method</u>. This test, however, doesn't check for PTFE, or most of the 4,700 PFAS compounds. By contrast, our tests looked for the total level of fluorine, which is the common element in all PFAS, and gives labs a clearer idea of how much PFAS might be in a product. Our test showed that fluorine composes 17% of Oral-B Glide floss. Concerned, Graham Peaslee told me he has switched to waxed floss.

Trying to identify the chemicals' sources is a bit maddening and stressful. It's simply not clear how much the PFAS in each item is contributing to the levels in our blood. "You worry because these are in your blood, and they may have been in your blood for a long time, so it's hard to know if a health condition that develops is caused by PFAS exposure, but that will be in the back of your mind," Ng she said. "It's fundamentally unfair that we have to deal with this for the convenience of not having eggs stick to the pan."

theguardian.com, 24 February 2021

<u>https://www.theguardian.com</a</u>>

This font is scientifically proven to help you retain info

2021-02-25

Have a large presentation to prepare for or a big exam? Try preparing for it in Sans Forgetica. <u>Sans Forgetica</u> is a downloadable font that is scientifically designed to help you remember your study notes. The font was designed by a group from RMIT University. San Forgetica was built by designers and behavioral scientists from RMIT University.

The group used cognitive psychology in the process to help you remember the information that you've read. The type is more difficult to

San Forgetica was built by designers and behavioral scientists from RMIT University.

CHEMWATCH
Bulletin Board
Curiosities
MAR. 05, 2021

read which basically makes your brain work harder and in turn, helps you remember what you read.

<u>Check it out and download it HERE.</u>

80sradio.iheart.com, 25 February 2021

<u>https://www.80sradio.iheart.com</a</u>>

Chemists close in on greener way to make plastics

2021-02-24

Plastics are a climate problem. Making precursors for common plastics, such as ethylene and carbon monoxide (CO), consumes fossil fuels and releases plenty of carbon dioxide (CO2). In recent years, chemists have devised bench-top reactors called electrochemical cells that aim to reverse the process, starting with water and waste CO2 from industrial processes and using renewable electricity to turn them into feedstocks for plastics. But that green vision has a practical problem: The cells often consume highly alkaline additives that themselves take energy to make.

"This has been a very challenging scientific problem," says Peidong Yang, a chemist at the University of California, Berkeley. Now, his team and a second group are reporting strides toward solving the alkalinity hurdle. One advance links two electrochemical cells in tandem to bypass the problem altogether, and another turns to an enzymelike catalyst to generate a desired chemical without consuming alkaline additives. The plastics industry isn't about to abandon fossil fuels for CO2 and renewable electricity, but "the field is picking up steam," says Feng Jiao, an electrochemist at the University of Delaware, Newark.

Companies currently make ethylene, a clear, sweet-smelling gas, by using superheated steam under pressure to "crack" the larger hydrocarbons in oil. Honed for decades, the process is extremely efficient, capable of producing ethylene for about $1000 per ton. But its production generates about 200 million tons of CO2 annually, 0.6% of the world's emissions.

Electrochemical cells, which operate like batteries in reverse, offer a greener alternative. In contrast to batteries, which convert chemical energy into electricity, electrochemical cells feed electricity to catalysts that make chemicals.

Both kinds of devices rely on two electrodes separated by an electrolyte that ferries charged ions. In electrochemical cells designed to convert CO2 to more valuable chemicals, the dissolved gas and water react at

But its production generates about 200 million tons of CO2 annually, 0.6% of the world's emissions.

the cathode to form ethylene and other hydrocarbons. The electrolyte is typically spiked with potassium hydroxide, which allows the chemical conversions to occur at a lower voltage, thereby boosting the overall energy efficiency. And it helps channel most of the added electricity toward creating hydrocarbons instead of hydrogen gas, a less valuable product.

But Matthew Kanan, an electrochemist at Stanford University, notes that the hydroxide carries an energy penalty of its own. The hydroxide ions react with CO2 at the cathode, forming carbonate, which precipitates out of solution as a solid. As a result, the hydroxide must be continually replenished—and hydroxide itself takes energy to make, making the overall process an energy loser.

In 2019, Kanan and his colleagues reported a partial solution. In place of CO2, they fed their cell CO, which doesn't react with hydroxide to form carbonate. The cell itself was highly efficient: Seventy-five percent of the electrons they fed their catalyst—a metric referred to as the faradaic efficiency (FE)—went to making acetate, a simple carbon-containing compound that can be used as a feedstock for industrial microbes. The trouble is that making CO normally requires fossil fuels, undoing some of the climate benefits of the scheme.

Now, a team led by Edward Sargent, a chemist at the University of Toronto, has taken this approach a step further. They started with a commercially available device called a solid oxide electrochemical cell, which uses high temperatures to convert CO2 to CO and could be powered by renewable electricity. The CO flows into another electrochemical cell whose catalysts are tailored to favor the production of ethylene, a more widely used commodity chemical than acetate. The tandem reactor no longer consumes hydroxide and has an FE of 65% for energy stored in ethylene produced by the device, the researchers reported last week in Joule. "That's a significant advance," Jiao says.

In the December 2020 issue of Nature Energy, Yang and his colleagues reported a very different way to get around the alkalinity problem. They redesigned the catalyst to work at a neutral pH without the addition of hydroxide ions. The device can convert the gas into CO while generating only a minimal amount of carbonate, a major energy win. But this cell doesn't yet convert that CO and hydrogen from water into ethylene and other hydrocarbons, Yang notes.

Better electrochemical cells aren't the only force propelling the research. As wind and solar energy generation burgeons, renewable energy prices

CHEMWATCH
Bulletin Board
Curiosities
MAR. 05, 2021

are plummeting. Those low energy prices mean that doubling of the overall energy efficiency of tandem electrochemical cells could make them cost competitive with the standard fossil fuel approach for manufacturing ethylene, Sargent and his colleagues report in a December 2020 paper in ACS Energy Letters. "We are trying to put that option in play," Kanan says.

sciencemag.org, 24 February 2021

<u>https://www.sciencemag.org</a</u>>

Having more friends may help female giraffes live longer

2021-02-25

Grown-up giraffes just aren't huggy, cuddling, demonstrative animals. So it took identity-recognition software grinding through five years of data to reveal that female social life matters to survival.

The more gregarious adult female giraffes in northern Tanzania's Tarangire ecosystem tend to live longer, concludes wildlife biologist Monica Bond of the University of Zurich. Females that typically hung around at least three others of their kind, were more likely to <u>outlive those with fewer routine companions</u>, Bond and colleagues report February 10 in Proceedings of the Royal Society B.

In published science, the idea that giraffes even have social lives isn't much more than a decade old, Bond says. (For the time being, Bond still treats giraffes as one species, Giraffa camelopardalis, until there's more agreement on how many species there are.) Adult males spend most of their time in solitary searches for females willing to mate, but females often hang around in groups.

Compared with bats clustering under a bridge or baboons grooming pals' fur, even the most sociable female giraffes often look as if they just happen to be milling around feeding in the same shrubbery. These "loose" groups, as Bond describes them, don't snuggle or groom each other. A group mostly just browses in the same vicinity, then may fray apart and reconfigure with different members in the fission-fusion pattern seen in many animals, such as dolphins. Yet closer looks have found that females, in their low-drama way, prefer certain neighbors and seem to avoid certain others.

Adult males spend most of their time in solitary searches for females willing to mate, but females often hang around in groups.

Bond encountered giraffes in the wild in 2007 on her first trip to Africa. "I loved everything," she says, but especially giraffes looking "as fanciful and weird as a unicorn." To examine their lives, she and colleagues have now recorded sightings for nearly 3,000 individuals in the Tarangire region. Each <u>giraffe's spots</u> are unique and remain identifiable throughout life, so photographs of the animals' torsos make identification possible (SN: 10/2/18).

Unlike Africa's much-studied Serengeti National Park, the Tarangire region lets researchers watch animals across a wide range of human impacts. At the low-impact end, giraffes munch acacia trees in protected parkland or stroll under baobab trees that are "sticking up like a giant broccoli," Bond says. Human influence becomes more common where the Maasai people tend their cattle, and the heaviest human footprints lie in the region's bustling towns.

Bond and her colleagues looked at how the kinds of plants eaten, soil types, closeness to humans and other factors affected females' chances of surviving from one season to the next. The most important predictor of survival for 512 adult female wild giraffes was the number of other females typically found around them. She doesn't think it's just that loners or some straggly groups get more easily picked off by predators. In this region, lions don't hunt in the big prides that can overwhelm adult prey and "a giraffe can kick a lion to death," Bond says.

Instead, Bond speculates that gregarious females might suffer less stress. Lions in the area stalk giraffe calves, for instance. In a bigger group, calves can cluster near each other in creches that a few females watch over, letting the other moms get a break. And when bigger female groups settle down at night, Bond sees some alert eyes among the drowsy ones that will get better rest.

This analysis, however, comes from just the Tarangire region. "It would be great for the methods to be replicated in other ecosystems to see how it holds up," says Arthur Muneza, the east Africa coordinator based in Nairobi, Kenya, for the Giraffe Conservation Foundation. A place where giraffes need to travel farther to find water or other vital resources, for instance, might make a difference in the results.

sciencenews.org, 25 February 2021

<u>https://www.sciencenews.org</a</u>>

CHEMWATCH
Bulletin Board
Curiosities
MAR. 05, 2021

What is chemistry?

2021-03-02

Sitting between biology and <u>physics</u>, the field of chemistry is sometimes called the central science. This branch of science deals not with the most basic elements of reality, such as fundamental particles, or the complex world of <u>living organisms</u>, but the in-between world of atoms, molecules and chemical processes.

Chemistry is the study of <u>matter</u>, analysing its structure, properties and behaviour to see what happens when they change in chemical reactions. As such, it can be considered a branch of physical science, alongside astronomy, physics and earth sciences including geology.

An important area of chemistry is the understanding of atoms and what determines how they react. It turns out reactivity is often largely mediated by the electrons that orbit atoms and the way these are exchanged and shared to create chemical bonds.

Chemistry has now split into many branches. For instance, analytical chemists might measure the traces of <u>compounds in ancient pottery</u> to discern what people were eating thousands of years ago.

<u>Biochemistry</u> is the study of the chemical processes that take place in living organisms, for instance in farming, and on the effect the resulting produce will have on our body's metabolism.

Organic chemistry, the study of compounds which contain carbon, connects up molecules in new ways to build and analyse an array of materials, from drugs to plastics to flexible electronics. Inorganic chemistry is the study of materials based primarily on elements other than carbon. Inorganic compounds can be pigments, <u>fertilisers</u>, catalysts and more.

Physical chemistry involves looking at chemistry through the lens of physics to study changes in pressure, temperatures and rates of conversion, for example, as substances react.

Chemists help us understand the nature and properties of the world around us and the history of chemistry is replete with discoveries that have furthered this. <u>Antoine Lavoisier</u> paved the way for modern chemistry. He helped give the field structure by developing an ordered language and symbolism. And his understanding of the constituent parts of air, as well as the process of combustion, disproved centuries of

Chemistry is the study of <u>matter</u>, analysing its structure, properties and behaviour to see what happens when they change in chemical reactions.

incorrect thinking. But there is perhaps no more important chemist than <u>Dmitri Mendeleev</u>, the Russian who in 1869 wrote down the symbols for all the known chemical elements, arranging them according to their atomic weight. He had created <u>the periodic table</u>, making it possible to predict how any given element would react with another, the compounds it would form and what kind of physical properties it would have.

Chemists have subsequently given us treatments for cancer, advanced our understanding of radioactive elements and developed mobile X rays for use in field hospitals – and that's just <u>Marie Curie</u>. <u>Rosalind Franklin</u> helped us understand that <u>DNA</u> was structured as a double helix, paving the way for the modern revolution in genetic science.

More recently, advances in chemistry and biology have contributed to the development of vaccines to the <u>coronavirus</u>, using our knowledge of DNA and <u>RNA</u> to create the first approved <u>messenger RNA vaccines (mRNA)</u>. From <u>the development of plastics</u>, and with it nylon, waterproof clothing and even bulletproof vests, to the liquid crystal display you are most likely reading this information on, right through to the complete synthesis of medicines, chemistry's contributions to modern life are myriad.

newscientist.com, 2 March 2021

<u>https://www.newscientist.com</a</u>>

Scientists created this seaweed to save the planet

2021-02-25

A new seaweed-based supplement could reduce a potent greenhouse gas released in burps — sheep burps, that is.

Diana Zlotnikov is a farmer in New York with plenty of burping sheep who release methane as a byproduct of their digestion system. Methane is a gas that has 28 times the warming capacity of carbon dioxide. Farming can produce a ton of <u>CO2 and methane gas</u> — two of the largest threats in greenhouse gases. Together they make up nearly 50 percent of all emissions and threaten the climate of our planet.

Five years ago, Diana started her farm with regenerative agriculture principles in mind — she implemented practices that would not only reduce the carbon footprint of her livestock but would help negate it. Diana has designed her farm to act as a carbon sink that can pull carbon from the atmosphere and <u>trap it in the soil</u>.

Methane is a gas that has 28 times the warming capacity of carbon dioxide.

CHEMWATCH
Bulletin Board
Curiosities
MAR. 05, 2021

But reducing the methane gas coming from her sheep was a much more difficult problem. Based on some research, she tried a mixture of feeds (garlic, legumes, alfalfa), but nothing worked.

One day her daughter Nicole, a sophomore in high school, came home from school in a researching frenzy. She had recently learned how methane gas was contributing to global warming and was determined to find a way to reduce the methane emissions caused by their farm. She came across asparagopsis taxiformis, a type of red seaweed, as an effective solution. It is not yet commercially available, but there are some people trying to change that.

Chemist and entrepreneur Alexia Akbay is one of them. Her company, Symbrosia, produces a red seaweed-based supplement that could reduce livestock methane production dramatically, but what will it take to get it to small farmers like Diana and Nicole? Check out the video above to see how Alexia and her team are domesticating a new seaweed species to tackle climate change — one sheep at a time.

theverge.com, 25 February 2021

<u>https://www.theverge.com</a</u>>

Remains of oldest American dog bolster idea that first humans arrived along the coat

2021-02-23

When researchers began to excavate a tunnellike cave on the west coast of Alaska in 1998, they were hoping to discover the remains of ancient bears. Instead, they unearthed something even more intriguing: a tiny chip of bone belonging to the first known dog in the Americas. The find supports the idea that dogs accompanied the first humans who set foot on these continents—and that both traveled there along the Pacific coast.

"This is a fantastic study," says archaeologist Loren Davis of Oregon State University, Corvallis, who was not involved in the research. "If the coastal migration theory is correct, we should expect to see exactly the kind of evidence reported in this study."

Researchers once thought humans initially entered the Americas about 12,000 years ago. That's when thick glaciers that covered much of North America began to melt. This opened a corridor, which allowed people to trek from Siberia across now-submerged land in the Bering Sea, and then into North America on the hunt for mammoth and other big game.

"When we went deeper, we found out it was from a dog."

But over the past decade, archaeologists have shown <u>people might have begun to move into North America much earlier</u>. To get around the glaciers, they would have island hopped by boat and walked along shorelines exposed by low sea levels. They traveled from Siberia through the Alaskan archipelago about 16,000 years ago, eventually making their way down the Pacific coast.

The sliver of dog bone supports this hypothesis. Recovered from among more than 50,000 prehistoric animal and human remains excavated near Wrangel Island, researchers didn't realize it came from a dog until they analyzed its DNA. "We started out thinking this was just another bear bone," says team leader Charlotte Lindqvist, a biologist at the University at Buffalo (UB). "When we went deeper, we found out it was from a dog."

The bone is about 10,200 years old, making its owner the <u>oldest dog known in the Americas</u>, the scientists report today in the Proceedings of the Royal Society B: Biological Sciences. (The previous record holders were <u>two 10,000-year-old dogs</u> unearthed in the U.S. Midwest.) And the dog's DNA holds clues to an even earlier time.

The pup's genome revealed it was closely related to the first known dogs, which researchers think were <u>domesticated in Siberia about 23,000 years ago</u>. Based on the number of genetic differences between the Alaskan dog and its Siberian ancestors, the team estimates the two populations split 16,700 years ago, plus or minus a few thousand years.

That's a clue that dogs—and their humans—left Siberia and entered the Americas thousands of years before North America's glaciers melted. "Here we have the genetic evidence, if not the physical evidence, [showing] dogs were already in the Americas with humans 16,000 years ago," says Durham University archaeologist Angela Perri, who was not part of the team.

The dates also line up with DNA-based estimates for when <u>modern Native Americans split off from ancestors in Siberia</u>, providing another line of evidence to pin down when the first migrations happened. "Understanding how the dogs moved also shows you how the humans moved," says Flavio Augusto da Silva Coelho, a graduate student at UB who did the DNA and other analyses.

Perri agrees. The study shows dogs are a useful way to track ancient human migrations, especially when human remains are missing or can't be sampled because of descendant community concerns, she says. Even

CHEMWATCH
Bulletin Board
Curiosities
MAR. 05, 2021

without human samples, "dogs can tell us some really interesting things" about our history, she says.

For example, chemical isotopes in the dog bone suggest the pooch ate marine animals. Because dogs aren't much good at fishing, their masters likely gave them scraps of fish, seal, or whale that they themselves hunted. "It's a strong indication people are feeding dogs," Perri says. "Everything in this study points to coastally adapted people and their dogs moving into the Americas."

sciencemag.org, 23 February 2021

<u>https://www.sciencemag.org</a</u>>

Redefining 'flesh-colored' bandages makes medicine more inclusive

2021-02-24

When Linda Oyesiku was a child, she skinned her knee on her school's playground. The school nurse cleaned her up and covered the wound with a peach-tinted bandage. On Oyesiku's dark skin, the bandage stuck out, so Oyesiku colored it with a brown marker. Years later, Oyesiku, now a medical student at the University of Miami Miller School of Medicine, needed to conceal a wound on her face after undergoing surgery. Well aware that the surgeon's office was unlikely to have a supply of brown bandages on hand, she came prepared with her own box. Those episodes left her wondering, though: Why were such bandages not more widely available?

The ubiquity of peach or "flesh" colored bandages provides a stark reminder that medicine remains centered on white patients, says Oyesiku, who calls for <u>brown bandages to become mainstream</u>. Brown bandages would symbolize that patients of color no longer represent "deviations from the norm," she writes in an October commentary in Pediatric Dermatology.

Peach-tinted bandages, invented by pharmaceutical company Johnson & Johnson in the 1920s, have been the standard-bearer for a century. Normalizing peach as the default flesh color has had knock-on effects: The nicotine and birth control adhesive patches that have since appeared on the market are also tinted peach, Oyesiku reports. Over the last several decades, smaller companies have introduced bandages for multiple skin tones, but those remain harder to come by than peach-tinted ones.

Brown bandages would symbolize that patients of color no longer represent "deviations from the norm," she writes in an October commentary in Pediatric Dermatology.

The issue goes deeper than a bandage, Oyesiku says. Treating whiteness as the default in medicine contributes to <u>Black and other minority groups' distrust of medical professionals</u> (SN: 4/10/20) and has led to <u>biases in machine learning programs</u> that U.S. hospitals use to prioritize patient care (SN: 10/24/19).

The field of dermatology represents an obvious starting point for dismantling structural racism in medicine, says dermatologist Jules Lipoff of the University of Pennsylvania. "Dermatology is racist only inasmuch as all of medicine and all of society is. But because we are at the surface, that racism is easier to recognize."

Consider "COVID toes." This condition, a symptom of COVID-19 infection, is characterized by swollen and discolored toes and occasionally fingers. When researchers reviewed 130 images of skin conditions associated with COVID-19, though, they found that <u>almost all the images depicted people with white skin.</u> Because COVID-19 has disproportionately impacted Black communities in the United States and the United Kingdom, photos depicting this population are crucial to proper diagnosis and care, researchers report in the September 2020 British Journal of Dermatology.

This scarcity of medical images for dark skin is pervasive. Only <u>4.5 percent of images in common medical textbooks depict dark skin</u>, Lipoff and colleagues reported in the Jan. 1 Journal of the American Academy of Dermatology.

At least when it comes to bandages, change might be afoot. Last June, in response to civil rights protests, <u>Johnson & Johnson pledged to roll out bandages for multiple skin tones</u>. Whether health care providers and stores routinely stock such bandages remains to be seen.

Brown bandages won't solve racism in dermatology, let alone medicine as a whole, but their presence would symbolize that everyone's flesh color matters, Oyesiku says. "Inclusivity in dermatology and medicine [is] so much deeper than a Band-Aid. But small things like this are a gateway to … other changes."

sciencenews.org, 24 February 2021

<u>https://www.sciencenews.org</a</u>>

CHEMWATCH
Bulletin Board
Curiosities
MAR. 05, 2021

A single male lyrebird can mimic the sound of an entire flock

2021-02-25

You might be able to do a mean celebrity impression or two, but can you imitate an entire film's cast at the same time? A male superb lyrebird (Menura novaehollandiae) can, well almost. During courtship and even while mating, the birds pull off a similar feat, mimicking the calls and wingbeat noises of many bird species at once, a new study shows.

The lyrebirds appear to be attempting to recreate the specific ecological soundscape associated with the arrival of a predator, researchers <u>report February 25 in </u>Current Biology. Why lyrebirds do this isn't yet clear, but the finding is the first time that an individual bird has been observed mimicking the sounds of multiple bird species simultaneously.

The uncanny acoustic imitation of multispecies flocks adds a layer of complexity to the male lyrebird's courtship song yet unseen in birds and raises questions about why its remarkable vocal mimicry skills, which include sounds like chainsaws and camera shutters, evolved in the first place.

Superb lyrebirds — native to forested parts of southeastern Australia — have a flair for theatrics. The males have exceptionally long, showy tail feathers that are shaken extensively in <u>elaborate mating dances</u> (SN: 6/6/13). The musical accompaniment to the dance is predominantly a medley of greatest hits of the songs of other bird species, the function of which behavioral ecologist Anastasia Dalziell was studying via audio and video recordings of the rituals.

"When you hear lyrebirds, you hear this very loud, very lyrical, dramatic delivery of mimicry of lots of different species of Australian birds," says Dalziell, of the University of Wollongong in Australia. The strident calls of kookaburras and parrots are common targets. "But when I started to record [lyrebirds] in detail and for very long periods of time, I realized that every now and then they did something completely different."

The lyrebirds would transition into a shorter, quieter song made of fluttering noises and scattered chirping. Dalziell thought it sounded like the mixed species "mobbing flocks" she'd experienced in her fieldwork, where prey birds spot a predator and aggregate into a loud, aggressive contingent that attempts to drive away the threat.

"But when I started to record [lyrebirds] in detail and for very long periods of time, I realized that every now and then they did something completely different."

Mimicking a mob

In this recording – taken in Sherbrooke Forest, in Victoria, Australia – a throng of several species of songbirds have aggregated into a noisy mob in response to a threat. Such "mobbing flocks" harass bird predators like snakes and hawks and are a reliable cue of such animals' presence.

In this recording, a male superb lyrebird ends its complicated courtship song and dance with an uncanny imitation of a raucous mobbing flock. By mimicking the simultaneous, agitated sounds of multiple species of songbirds, the male might be simulating a scenario of predatory peril.

When Dalziell and her colleagues analyzed the acoustic signatures of the lyrebirds' strange songs and compared them to those of actual mobbing flocks, the similarities were striking. It was an accurate enough impression to fool other birds too. When the team played back the lyrebird's fake flock noises in the wild, songbirds were attracted to the speakers to a similar degree as when the speakers played audio from a real mobbing flock. But the songbirds largely ignored the speakers when they played the lyrebird's typical mimicked melodies.

"Mimicking the calls and the wingbeats of a flock of small songbirds while they are mobbing predators is quite convincing to my human ears," says Çağlar Akçay, a behavioral ecologist at Koç University in Istanbul not involved with this research. The findings, he says, are part of a "very cool study on a very cool animal."

While the lyrebirds could be mimicking a mobbing flock, they might not be doing so to mimic the mobbing intention itself, says Dominique Potvin, an ecologist at the University of the Sunshine Coast in Queensland, Australia, also not involved with this research. Replicating mobbing calls, she says, could just be a difficult vocal feat meant to impress a mate.

Some clues about why the males sing these mobbing songs might come from their timing. Video recordings reveal that the males make the calls right at the end of a courtship display and during mating. The flock mimicry may not be about wooing a female, but deceiving her into believing a predator is nearby, Dalziell says. Such a tactic by this "master illusionist" might enhance the chance of a successful mating by keeping the female close.

At the close of trying to impress a female with an elaborate song and dance, the male lyrebird adds a remarkable flourish. Its voice recreates the

CHEMWATCH
Bulletin Board
Curiosities
MAR. 05, 2021

alarmed chirps and wingbeats of many birds of different species, a degree of mimicry prowess never seen before in birds.

Akçay is skeptical of this explanation. "Intuitively, it seems that it wouldn't be exactly adaptive for a female to return to an area — to copulate no less — if she is under the impression that there is a predator around," he says.

The findings generate lots of new avenues for research, notes Dalziell. Determining if females react to the simulated mobbing flock similarly to the real version might be one way to test the deception idea.

sciencenews.org, 25 February 2021

<u>https://www.sciencenews.org</a</u>>

CHEMWATCH

Bulletin Board

Technical Notes

MAR. 05, 2021

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

CHEMICAL EFFECTS

Do polystyrene nanoplastics affect the toxicity of cadmium to wheat (Triticum aestivum L.)?

'It's all the other stuff!' How smokers understand (and misunderstand) chemicals in cigarettes and cigarette smoke

Is your environment making you older? Molecular biomarkers and new approaches to investigate the influences of environmental chemicals through aging

Early occupational exposure to lead on neutrophil-to-lymphocyte ratio and genotoxicity

Persistent Organic Pollutants (POPs) and Related Chemicals in the Global Environment: Some Personal Reflections

ENVIRONMENTAL RESEARCH

Time trends of persistent organic pollutants (POPs) and Chemicals of Emerging Arctic Concern (CEAC) in Arctic air from 25 years of monitoring

Circular economy based landfill leachate treatment with sulphur-doped microporous biochar

OCCUPATIONAL

Non-auditory effects of industrial chronic noise exposure on workers; change in salivary cortisol pattern

Long-term exposure to ambient PM 2.5 and stroke mortality among urban residents in northern China

PHARAMACEUTICAL/TOXICOLOGY

Neurobehavioural and cognitive effects of prenatal exposure to organochlorine compounds in three year old children