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CONTACT US

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

1227 Glen Huntly Rd
Glen Huntly
Victoria 3163 Australia

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

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ASIA PACIFIC

Workplace exposure standards open for public comment – Release 14: Includes Isocyanates and others*

2020-03-13

Workplace exposure standards open for public comment – Release 14: Includes Isocyanates and others*

We are calling for comments on the recommendations for chemicals in Release 14.

Safe Work Australia is evaluating the Workplace exposure standards for airborne contaminants to ensure they are based on the highest quality evidence and supported by a rigorous scientific approach.

Release 14 is now open for public comment. Please note that this release includes chemicals that were deferred from previous releases as well as chemicals that do not currently have an Australian workplace exposure standard.

Chemicals in this release that do not currently have an Australian workplace exposure standard are:

N-nitrosodimethylamine

2,4-pentanedione

*For a complete list of chemicals in Release 14 please visit our consultation platform Engage.

In particular, we are seeking comments of a technical nature regarding: the toxicological information and data that the value is based upon, and the measurement and analysis information provided.

Access our consultation platform, Engage to provide your comments on the draft evaluation reports and recommendations for Release 14.

Public comment will close on 10 April 2020.

The feedback we receive will be considered when making final recommendations for workplace exposure standards.

Workplace exposure standards open for public comment – Release 14: Includes Isocyanates and others*

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The draft evaluation reports and recommendations for the remaining chemicals will be released throughout 2019 and 2020

Safe Work Australia, 13 March 2020

<https://www.safeworkaustralia.gov.au/>

Australia Workplace Exposure Standards updated

2020-03-04

On 18 February 2020, Safe Work Australia's Workplace Exposure Standards were updated. Limits for 137 substances were updated.

Yordas Hive, 4 March 2020

<https://www.yordasgroup.com/hive/news/article/841>

Malaysia GHS classifications updated

2020-02-26

Malaysia's Department of Occupational Safety and Health has issued an amendment to the Industry Code of Practice on Chemical Classification and Hazard Communication. 46 substances (already classified) had their classifications updated while 437 substances (previously not classified) were assigned new classifications.

Yordas Hive, 26 February 2020

<https://www.yordasgroup.com/hive/news/article/832>

Inventory of Existing Chemical Substances in China (IECSC) updated

2020-01-31

On 3 January 2020, China's Ministry of Ecology and Environment (MEE) updated the Inventory of Existing Chemical Substances in China (IECSC). 47 substances were added.

Yordas Hive, 31 January 2020

<https://www.yordasgroup.com/hive/news/article/805>

On 18 February 2020, Safe Work Australia's Workplace Exposure Standards were updated.

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AMERICA

Canada DSL updated

~w2020-03-04

The following substances have been added to Canada's Domestic Substances List (DSL):

1. Nonadecane, 9-methylene-, mixed with 1-decene, dimers and trimers, hydrogenated
2. Alkanes, C14-C16-branched and linear
3. Amines, bis(C11-14-branched and linear alkyl), 3-[[bis(2-methylpropoxy)phosphinothioyl]thio]-2-methylpropanoates
4. Amines, bis(hydrogenated palm-oil alkyl)hydroxy
5. Tall oil, polymer with polyethylene glycol and succinic anhydride monopolyisobutylene derivs.
6. Alkanes, C18-C24-branched and linear
7. Alkanes, C15-C19-branched and linear
8. Alkanes, C12-C15-branched and linear
9. Pentanoic acid, 2,2-bis[[[(1-oxopentyl)oxy]methyl]-1,3-propanediyl ester
10. Decanedioic acid, polymers with glycerol, polyethylene glycol and succinic anhydride monopolyisobutylene derivs.
11. 2-Propenoic acid, 2-methyl-, 2-hydroxyethyl ester, polymer with 2-propenoic acid and 3,3,4,4,5,5,6,6,7,7,8,8,8-trideca-fluorooctyl 2-methyl-2-propenoate, sodium salt
12. Soybean oil, maleated, polymers with ethylene oxide, propylene oxide and ricinoleic acid
13. Fatty acids, C18-unsatd., dimers, polymers with neopentyl glycol
14. Hexanedioic acid, polymer with 1,4-butanediol, 1,6-diisocyanatohexane, dimethyl carbonate, 1,6-hexanediol and 5-isocyanato-1-(isocyanatomethyl)-1,3,3-trimethylcyclohexane
15. 2-Propenoic acid, 2-methyl-, 3-[1,1-bis[[dimethyl[2-[3,3,3-trimethyl-1,1-bis[(trimethylsilyl)oxy]disiloxanyl]ethyl]silyl]oxy]-3,3-dimethyl-3-[2-[3,3,3-trimethyl-1,1-bis[(trimethylsilyl)oxy]-1-disiloxanyl]ethyl]-1-disiloxanyl]propyl ester, polymer with butyl 2-propenoate and methyl 2-methyl-2-propenoate
16. 2-Propanoic acid, methyl ester, homopolymer, docosyl ester
17. Ethanesulfonic acid, 2-[methyl(1-oxododecyl)amino]-, sodium salt (1:1)

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18. Poly(oxy-1,2-ethanediyl), a-sulfo-?--(tridecyloxy)-, sodium salt (1:1)
19. Diglycol/cyclohexanedimethanol/isophthalates/sulfoisophthalates copolymer average MW 6100-8000 g/mol
20. 1,3-Benzenedicarboxylic acid, polymer with hexanedioic acid, 1,6-hexanediol, 3-hydroxy-2-(hydroxymethyl)-2-methylpropanoic acid and 1,1'-methylenebis[4-isocyanatocyclohexane], compd. with N,N-diethylethanamine

~sYordas Hive, 4 March 2020

<https://www.yordasgroup.com/hive/news/article/842>

TSCA Inventory March 2020 Update

2020-03-12

The non-confidential portion of EPA's Toxic Substances Control Act Chemical Substance Inventory (TSCA Inventory) is updated approximately every six months. It can be searched in multiple ways. This page provides ways to download the non-confidential Inventory and offers help in using these downloaded files. The March 2020 update, which added 81 additional chemicals to the TSCA Inventory, is available below. The Inventory now contains 86,405 chemicals of which 41,484 are active.

On this page:

- [Download the non-confidential TSCA Inventory](#)
- [Learn how the data is formatted to help you search](#)
- [Meaning of EPA regulatory flags](#)
- [Alternate ways to access the non-confidential TSCA Inventory](#)

US EPA, March 2020

<https://www.epa.gov/tsca-inventory/how-access-tsca-inventory>

Indiana adopts law restricting PFAS-containing foams

2020-03-12

Indiana has joined a growing number of US states to adopt legislation restricting the use of firefighting foams containing per- and polyfluoroalkyl substances (PFASs).

The measure (HB 1189), signed into law on 11 March, prohibits the use for training or testing purposes of 'class B' firefighting foam containing any intentionally added PFASs.

The non-confidential portion of EPA's Toxic Substances Control Act Chemical Substance Inventory (TSCA Inventory) is updated approximately every six months.

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There is an exception, however, for testing facilities that have implemented “appropriate measures” to prevent releases to the environment.

And unlike measures in several other states, the law does not prohibit or restrict the manufacture, sale or distribution of firefighting foams containing intentionally added PFASs, nor their use in emergency firefighting or fire prevention operations.

ChemicalWatch, 12 March 2020

<https://chemicalwatch.com/99829/indiana-adopts-law-restricting-pfas-containing-foams>

EUROPE

Norway begins checks on compliance with CLP labelling

2020-03-05

Follow-up to 2017-2018 project includes biocides

Inspectors from Norway’s environment agency have embarked on a project to check that chemicals sold to consumers in the country contain the correct hazard labelling and packaging.

They are visiting stores to find out whether retailers are complying with obligations laid down in the EU’s CLP Regulation and are targeting products including cleaning agents, car and boat care products, and other chemicals for home use.

The exercise, which runs for the month of March, is a follow-up to checks conducted at stores between 2017 and 2018.

This year, inspectors will also check compliance under the EU’s biocidal products Regulation on goods including insecticides and repellents. An exercise from 2018 found that half of biocidal products checked contained substances that were banned or restricted.

In a separate project last year, inspectors detected incorrect hazard labelling and classification in nearly 90% of interior fragrance products.

Meanwhile, at the end of 2019, an EU-wide enforcement project report revealed that a significant number of classification and labelling of chemical mixtures did not meet basic legal obligations. The Echa Enforcement Forum’s REACH-En-Force (Ref-6) project saw inspectors in 29

**Follow-up to
2017-2018 project
includes biocides**

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countries checking 3,391 mixtures and inspecting 1,620 companies during 2018

ChemicalWatch, 5 March 2020

<https://chemicalwatch.com/98150/norway-begins-checks-on-compliance-with-clp-labelling>

Conclusions on three active substances and four applications for Union authorisation

2020-03-09

The Biocidal Products Committee (BPC) adopted three opinions on active substances, including one proposing non-approval, and four opinions on Union authorisation – with one not supporting authorisation.

Helsinki, 9 March 2020 – The BPC concluded on the applications for the following active substance product-type combinations:

Chlorophene for product-type 2 (disinfectants and algacides not intended for direct application to humans or animals);

Glyoxal for product-types 2, 3 (veterinary hygiene) and 4 (food and feed area);

Reaction mass of peracetic acid and peroxyoctanoic acid for product-types 2, 3 and 4.

The committee's opinion is that chlorophene cannot be approved as a heavy-duty disinfectant as there are unacceptable risks that cannot be mitigated. According to the committee's opinion the two other active substances can be approved.

The BPC also adopted opinions on four applications for Union authorisation of a biocidal product family based on the following active substances:

propan-2-ol in product-types 2 and 4;

CMIT/MIT in product-type 6 (preservatives for products during storage);

peracetic acid in product-type 2; and

hydrogen peroxide in product-type 2.

The Biocidal Products Committee (BPC) adopted three opinions on active substances, including one proposing non-approval, and four opinions on Union authorisation – with one not supporting authorisation.

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The committee's opinion is that the biocidal product family based on hydrogen peroxide cannot be authorised as it cannot be demonstrated that this product family is sufficiently effective to act as a disinfectant.

The European Commission together with the EU Member States will take the final decision on the approval of the active substances and on the Union authorisation of the biocidal product families.

The committee met from 4 to 5 March 2020. The opinions will be available on ECHA's website in the near future. The next meeting will be in June 2020.

ECHA, 9 March 2020

<https://echa.europa.eu/-/conclusions-on-three-active-substances-and-four-applications-for-union-authorisation>

Track legal obligations with the new EU Chemicals Legislation Finder

2020-03-11

ECHA's new online service, the EU Chemicals Legislation Finder (EUCLEF), gives companies access to a free-of-charge overview of 40 pieces of EU chemicals legislation they may need to comply with.

Helsinki, 11 March 2020 – With EUCLEF's launch, information on 40 pieces of EU chemicals legislation is now easily accessible in one place, bringing clarity to companies, in particular for SMEs, on which pieces of legislation apply to their substances.

Integrated into ECHA's chemicals database, companies can use EUCLEF to navigate through the EU chemicals legislative framework and find relevant information on how their substances are regulated across the EU. This will give businesses a better understanding of the obligations they might have so they can ensure they are legally on the market.

The first version of the finder covers legislation dealing with air and water quality, worker protection, pesticides, food contact materials, cosmetic products, toy safety and many more. A further 16 pieces of legislation are planned to be added to EUCLEF in 2021.

"EUCLEF will be really helpful for companies, especially SMEs, who need to track their obligations across different EU laws. Small businesses are the backbone of Europe's chemicals industry. EUCLEF will help them save time and money and to focus on what really matters, innovating and growing

ECHA's new online service, the EU Chemicals Legislation Finder (EUCLEF), gives companies access to a free-of-charge overview of 40 pieces of EU chemicals legislation they may need to comply with.

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their business while safeguarding our health and the environment," says Bjorn Hansen, ECHA's Executive Director.

A dedicated regulatory support service has also been made available so that companies can ask questions about all the different EU chemicals legislation covered by EUCLEF.

EUCLEF is funded by the EU Programme for Competitiveness of Enterprises and Small and Medium-sized Enterprises (COSME).

ECHA, 11 March 2020

<https://echa.europa.eu/-/track-legal-obligations-with-the-new-eu-chemicals-legislation-finder>

Germany Publishes English Translation of TRGS 527: Activities with Nanomaterials

2020-03-02

The Federal Institute for Occupational Safety and Health (BAuA) issues Technical Rules for Hazardous Substances (TRGS), which reflect the state of technology, occupational safety and health, and occupational hygiene, as well as other verified scientific knowledge relating to activities involving hazardous substances, including their classification and labeling. BAuA has published an English translation of TRGS 527: "Activities with nanomaterials." TRGS 527 contains rules for protection of employees at the workplace during activities with substances, mixtures, and products consisting of or containing nanomaterials. It includes provisions on:

The scope of application;

Definition of terms;

Identification of risks;

Risk assessment;

Protective measures;

Effectiveness testing; and

Working instructions and provision of information to employees, documentation.

TRGS 527 defines nanomaterials to include nanoforms of substances registered under the European Union (EU) Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) regulation, as well

The Federal Institute for Occupational Safety and Health (BAuA) issues Technical Rules for Hazardous Substances (TRGS), which reflect the state of technology, occupational safety and health, and occupational hygiene, as well as other verified scientific knowledge relating to activities involving hazardous substances, including their classification and labeling.

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as non-registered nanoforms according to Annex VI of Regulation (EC) No. 1907/2006, as amended by (EU) 2018/1881. TRGS 527 notes that the European Commission (EC) does not distinguish between established and new materials. It does not apply to:

Natural nanomaterials if no activities are carried out with them;

Nanomaterials created as a result of work processes (g., weld fumes, diesel particles) if they are not handled as products. For activities such as welding, cutting, and similar procedures involving metal materials, TRGS 528: "Welding work" applies. For activities in work areas in which diesel exhaust gases may occur, TRGS 554: "Exhausts of diesel engines" applies; and

TRGS 527 amends the rules for hazardous substances regarding the risks caused by nanomaterials and in particular TRGS 400: "Risk assessment for activities involving hazardous substances."

TRGSs specify, within their scope of application, the requirements of the German Hazardous Substances Ordinance. If an employer complies with TRGSs, that employer may assume that the relevant requirements of the Ordinance have been met. If the employer chooses a different solution, that solution must achieve at least the same level of safety and health protection for employees. BAuA notes that the English translation is an unofficial version. Only the original German text has legal effect.

Nano and Other Emerging Chemical Technologies Blog, 02 March 2020

<https://nanotech.lawbc.com/2020/03/germany-publishes-english-translation-of-trgs-527-activities-with-nanomaterials/>

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REACH Update

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Call for evidence: occupational exposure limit for asbestos and cadmium and its inorganic compounds

20200310

ECHA has launched calls for evidence on cadmium and its inorganic compounds and on asbestos. The aim is to get information on exposure, health effects, toxicology, epidemiology and modes of action. For cadmium and its inorganic compounds, also information on uses is requested. Any other relevant information is also welcome. The European Commission has asked ECHA to review the existing limits of these substances. The information will help ECHA to draft the scientific reports related to exposure limits at the workplace.

The deadline for comments is 2 June 2020.

ECHA, 12 March 2020

<https://echa.europa.eu/es/-/call-for-evidence-occupational-exposure-limit-for-asbestos-and-cadmium-and-its-inorganic-compounds>

Do you have further information on uses of seven substances proposed for authorisation?

2020-03-05

ECHA/NR/20/07

ECHA invites comments on its proposal to include seven hazardous substances in the REACH Authorisation List. Comments can be given by 5 June 2020.

Helsinki, 5 March 2020 – ECHA is considering recommending seven new substances for the European Commission to include in the Authorisation List (Annex XIV to REACH). The substances are listed in the annex to this news release.

ECHA invites comments and further information, in particular on uses of the substances, on possible exemptions from the authorisation requirement as well as on the structure and complexity of the supply chains.

In parallel to ECHA's consultation, the European Commission is calling for information on the possible socio-economic consequences of including these seven substances in the Authorisation List. The information received will be passed on directly to the Commission and will not be considered by ECHA.

ECHA has launched calls for evidence on cadmium and its inorganic compounds and on asbestos.

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If a substance is included in the Authorisation List, it can only be placed on the market or used after a given date if an authorisation is granted for a specific use. Companies that are using, manufacturing or importing these substances can apply for authorisation.

Background

ECHA regularly recommends substances from the Candidate List for the Commission to include in the Authorisation List. The draft recommendation is based on an assessment of the data in registration dossiers and other available information, and an initial discussion with the Member State Committee. Registrations will be checked for any updates at the end of the consultation.

The Member State Committee will prepare an opinion on ECHA's draft recommendation taking into account the comments received during this consultation. Based on the opinion of the Committee and the consultation, ECHA will provide its final recommendation to the European Commission in Spring 2021. This will be ECHA's 10th recommendation. The Commission will decide on which of the substances to include in the Authorisation List and on the respective conditions applicable for each substance.

ECHA News, 05 March 2020

<https://echa.europa.eu/-/do-you-have-further-information-on-uses-of-seven-substances-proposed-for-authorisation->

50 % more REACH dossiers checked for compliance in 2019

2020-02-26

ECHA/PR/20/03

In 2019, ECHA increased the number of checks carried out on companies' chemical safety data by 50 %. Important safety data has been requested to clarify long-term effects of chemicals on human health and the environment, including those affecting reproduction and causing genetic mutations.

Helsinki, 26 February 2020 – Last year, ECHA conducted 301 in-depth checks on almost 3 000 dossiers, covering 274 unique chemicals.

Decisions to make the registration compliant were sent to all registrants of the chemical – a change to the earlier practice where only the lead

Helsinki, 26 February 2020 – Last year, ECHA conducted 301 in-depth checks on almost 3 000 dossiers, covering 274 unique chemicals.

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registrant was contacted. This contributed to a better collaboration among co-registrants.

More checks were also done on dossiers from companies that registered their chemicals separately from joint submissions. This is to ensure that the reason registrants submitted their dossiers separately was legally justified and data-sharing obligations are met.

The focus has continued to be on information needed to clarify the long-term effects on human health or the environment. Information was requested in 245 of the 301 checks, with most asking to clarify long-term effects on the development of unborn children, genetic mutations, and aquatic toxicity. ECHA also examined close to 100 testing proposals submitted by industry.

Overall, in the last decade, ECHA has carried out an in-depth check of more than 1 000 chemicals across all tonnage bands. Over 20 % of the large volume chemicals with the highest potential exposure have been checked in depth. More than 10 % of the checked chemicals have been proposed as candidates for harmonised classification at EU/EEA level.

Bjorn Hansen, ECHA's Executive Director says: "Chemical safety impacts citizens' health. We know that European consumers are more worried about impacts of chemicals than ever before. To make sure companies follow the law and ensure the safety of the chemicals they sell, we have stepped up our efforts to check more registrations. This work is crucial to prevent harmful chemicals entering the EU market and ultimately minimising chemical pollution in Europe."

With regards to substance evaluation done at the Member State level, 264 chemicals were evaluated between 2012 and 2019. For 181 chemicals, further information was needed to clarify suspected concerns. For around one-third of the 181 chemicals, risk management was needed – for example, four were flagged for restriction, nine were identified as substances of very high concern and 41 needed harmonised classification.

A full breakdown of the numbers is published in ECHA's annual evaluation statistics overview along with recommendations for registrants on how they can improve their dossiers.

ECHA, 26 February 2020

<https://echa.europa.eu/-/50-more-reach-dossiers-checked-for-compliance-in-2019>

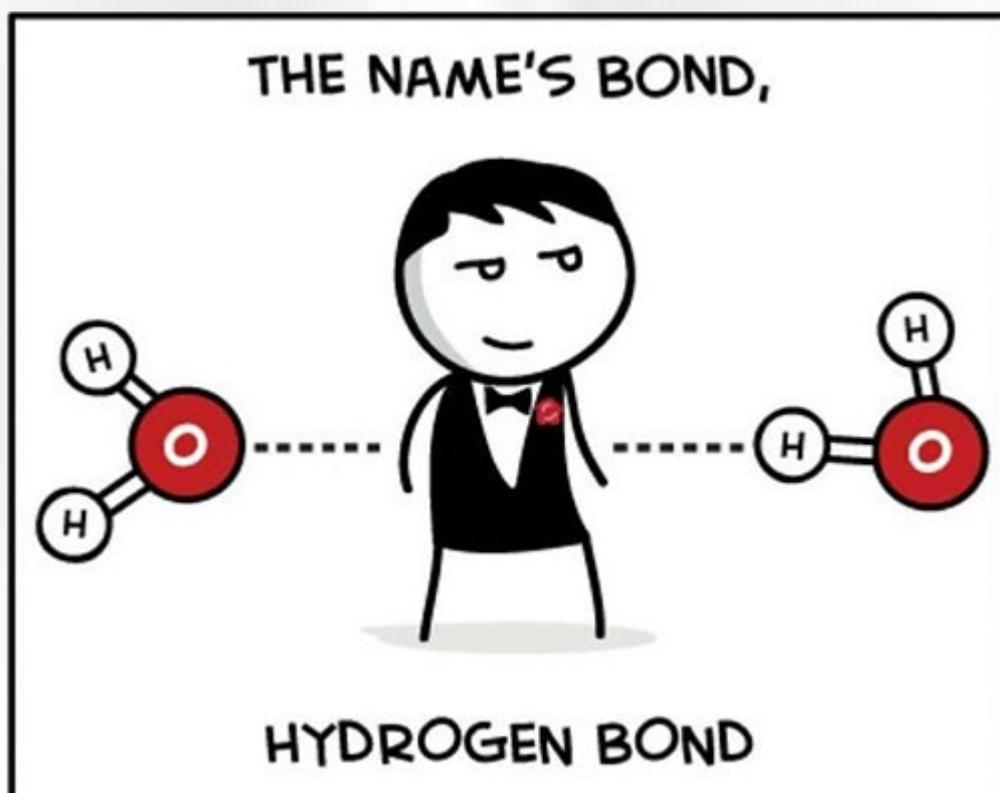
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Janet's Corner

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The Name's Bond, Hydrogen Bond

2020-03-10



<https://www.chemistryjokes.com/jokes/the-names-bond-hydrogen-bond/>

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Hazard Alert

MAR. 20, 2020

Potassium Fluoride

2020-03-10

Potassium fluoride is a chemical compound with the formula KF. It is one of two primary sources of the fluoride ion for chemistry and applications in manufacturing. It is part of the alkali halide family and can be found naturally as the rare mineral carobbiite. Inorganic potassium fluoride is created by dissolving potassium carbonate in hydrofluoric acid. [1] Potassium fluoride takes the form of white crystals or powder and it has a sharp saline taste. The compound can be moved in a solid or aqueous solution form and is toxic if ingested. [2]

USES [2,3]

Potassium fluoride is commonly used in etching and frosting glass, making silver solder flux and insecticides. [2, 3] It is also used as a means of salt fluoridation through the addition of potassium fluoride to iodised salt. The compound is used as a catalyst in organic synthesis and is also a primary ingredient in pesticides and disinfectants. [3]

ROUTES OF EXPOSURE

- People can be exposed to potassium fluoride by inhalation, consumption of contaminated food or drink and by skin contact. [4]

HEALTH EFFECTS

Acute Effects [4]

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

- If someone is exposed potassium fluoride in high doses, they may experience coughing, a dry/sore throat and irritation of the respiratory tract and nasal mucous membranes. The person may also experience other respiratory difficulties.
- If there is continuous exposure or contact to potassium fluoride, it will cause caustic burns and/or corrosion of the area that has been exposed.
- If swallowed, potassium can cause severe vomiting, diarrhoea and feelings of weakness within a short period of time. If exposed for a longer period of time, there might be CNS depression and negative cardiac effects.

Potassium fluoride is a chemical compound with the formula KF.

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Chronic Effects [4]

Potassium fluoride is toxic to multiple body systems. Long-term or repeated exposure can cause pain in the joints and slowing ossification of the bones. Chronic exposure to the compound can cause discolouration of the teeth, inflammation of the respiratory tract, pain in the nasal septum, loss of appetite and feelings of weakness.

SAFETY

First Aid Measures [4]

- Ingestion: If ingested, rinse mouth and DO NOT induce vomiting. Give the victim lots of water to drink. Immediately call a doctor or a poison centre. If ingested in large quantities, go straight to the emergency department.
- Skin contact: In case of skin or hair contact, remove/take off all contaminated clothing immediately and thoroughly rinse with water. DO NOT apply any type of neutralizing agent, including chemical. If irritation continues, take victim to a doctor.
- Eye contact: Flush eyes carefully with water for several minutes. Check for and remove contact lenses if easy to do so. Continue rinsing. If irritation continues, take victim to ophthalmologist.
- Inhaled: Take contaminated person to nearest fresh air source and monitor their breathing. Call a doctor/poison centre immediately.

Exposure Controls/Personal Protection [4]

- Engineering controls: Safety showers and emergency eyewash fountains should be accessible in the immediate area of the potential exposure. Ensure there is adequate ventilation. Whenever possible, material should be handled in a laboratory.
- Personal protection: Safety glasses, protective and dustproof clothing, gloves and a combined gas/dust mask with a P3 filter.

REGULATION [5]

United States:

Agency	Level
ACGIH (American Conference of Governmental Industrial Hygienists)	2.5 micrograms/m ³ averaged over an 8-hour shift

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Agency	Level
NIOSH (National Institute for Occupational Safety and Health)	2.5 micrograms/m ³ averaged over a 10-hour shift
OSHA (Occupational Safety and Health Administration)	2.5 micrograms/m ³ averaged over an 8-hour shift

Australia [6]

Safe Work Australia: WorkSafe Australia has set an 8-hour time weighted average (TWA) concentration for Fluorides of 2.5 mg/m³ over a 5-day working week. In industrial settings, it is recommended that exposure be kept below this level. This can be done in multiple ways including the use of local exhaust ventilation.

REFERENCES

1. https://en.wikipedia.org/wiki/Potassium_fluoride
2. <https://pubchem.ncbi.nlm.nih.gov/compound/Potassium-fluoride#section=3D-Status>
3. <https://www.chemistrylearner.com/potassium-fluoride.html>
4. <http://www.labchem.com/tools/msds/msds/LC19090.pdf>
5. <https://nj.gov/health/eoh/rtkweb/documents/fs/1565.pdf>
6. <https://www.chemsupply.com.au/documents/PL0901CHBH.pdf>

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Gossip

MAR. 20, 2020

After coronavirus, smart masks may be our weapon against 21st century plagues

2020-02-20

One of the biggest consumer electronics manufacturers in the world wants to monitor health through a new type of facial mask capable of monitoring atmospheric and body conditions in real time, but its patented technology may arrive too late to defend ourselves against this first wave of coronavirus. Chinese company Xiaomi is working on a new type of facial “smart mask” that will keep track of the air around us and coming out of our lungs using built-in sensors and electronic systems. The company — which is the fourth largest smartphone manufacturer in the planet and sells everything from TVs to electric scooters worldwide — is already selling masks in China as fast as it can make them thanks to the coronavirus epidemic. But the new patented mask does a lot more than its current Xiaomi Youpin F95 Face Mask (seen above). The patent — published by the United States Patent and Trademark Office — describes a new type of high tech wearable equipped with sensors that capture information about the environment *and* the wearer’s health.

Constant monitoring of environment and user’s breathing, activity

Inside, there is also the necessary processor and electronics to collect that data in real time, storing it for access by other devices like smartphones or computers in the cloud. The mask also has its own battery power to both feed these electronics and the device’s air filter. The mask is also designed to know what the user is doing using accelerometers and gyroscopes. According to Xiaomi, this will help computers to make a more exact calculation about pollution absorption: the more active the user is, the more air will be taken in. These sensors help record “total wearing time, pollution absorption, breathing volume, breath counts” and others. Talking to your smartphone or smartwatch, the facial device will be able to tell users about both the quality of the air around them, as well, as alerting the user or doctors of any potential breathing abnormalities.

The unstoppable rise of the health wearable

We have seen the rise of wearables to keep track of our health in the last few years. The Apple Watch has become the epitome of this wave of devices. Apple’s tiny gadget can monitor some aspects of your heart’s health and body activity but it still missing a lot of stuff. It seems that Xiaomi, given the current climate of fear, uncertainty, and doubt, wants to go a lot further with active monitoring of a lot more external and internal

Chinese company Xiaomi is working on a new type of facial “smart mask” that will keep track of the air around us and coming out of our lungs using built-in sensors and electronic systems

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parameters. Plus, a mask — unlike a watch — can actually protect you against many environmental threats. Can you imagine a future in which everyone is wearing masks along with their smartphones? In China — and many other parts of the globe — they don't have to imagine it. They have been doing it for years now and it's only going to keep happening. So it makes total sense to make those masks smart and more useful. Still, it's a bloody scary world when consumer electronics companies are making devices like this to keep us safe. But this, I'm afraid, is exactly where we are headed. Too bad that the miniaturized technology to detect pathogens in real time doesn't exist yet. It will happen eventually, but all we hypochondriacs can use some of that action right now.

[tomsguide.org](https://www.tomsguide.com), 20 February 2020

<https://www.tomsguide.com>

FACT: Syphilis may have had a major impact on fashion

2020-02-26

Syphilis, while nothing to be ashamed of, is not what you'd call a glamorous condition. It starts with painless sores followed by a rash, but left untreated by antibiotics, the disease's tertiary phase can cause unsightly bulbous growths, necrotizing ulcers, and hair loss, not to mention more pressing concerns like heart and neurological damage. According to some scholars, these unfortunate side effects didn't necessarily leave sufferers cowering in the shadows—in some cases, fashion may have evolved to help hide the signs of late-stage syphilis. The most commonly cited example of this is the powdered wig, which didn't become the sign of polite society we see in period films until the influence of King Louis XIV of France. Historians note that the wigs were of middling popularity until this young king began to don them during the 17th century. Louis XIV started to lose his hair around age 17, so it's not surprising that he turned wigs into a fashion trend. But it's quite possible that his hair loss—and perhaps that of his cousin, King Charles II of England, who also loved a good powdered wig—was due to syphilis. In any case, the royal love of fussy wigs provided a great cover for the truly countless number of syphilis patients running around Europe at the time. Another, slightly more controversial theory: That codpieces served to mask the otherwise suspicious bulge created by medicated bandages wrapped around genital sores. Not all historians buy this notion, and the codpiece's remarkably short-lived period of popularity means we know precious little about them. Too bad shoving stuff down your pants didn't stick around. Finally, our third potential syphilitic fashion

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moment: Sunglasses. Because, well, where else are you going to put your fake nose? Listen to this week's episode to find out more.

popsci.com, 26 February 2020

<https://www.popsci.com>

Why human feet evolved arches—and what happens if you lack them

2020-02-26

For more than a century, evolutionary biologists have admired the exquisite design of the human foot and how its features make it possible for us to effortlessly walk upright. Our short toes, for example, enable us to run long distances. Now, a paper published Wednesday in *Nature* makes the case that another part of our anatomy—an arch running over the top of the foot—plays a bigger role than previously thought in mobility. The finding increases our understanding of the evolution of foot biomechanics, experts say, and could lead to more accurate robotic and prosthetic feet, help orthopedic doctors treat foot disorders and even inspire better shoe designs. Called the transverse tarsal arch (that's the horizontal curve across the top of your foot), this previously underappreciated attribute accounts for more than 40 percent of the stiffness of the modern human foot, according to the team of researchers from the United States, Japan and the United Kingdom. This upper arch tag teams with the better known example along the bottom side of the foot called the medial longitudinal arch. Together, they account for our uniquely human feet's stiffness, which allows us to push off without falling over and distinguishes us from other primates that need a more flexible foot to grasp tree branches. "We were surprised by what an effect it had," says Madhusudhan Venkadesan, the study's lead author and an assistant professor in mechanical engineering and materials science at Yale University. "There have been major debates on how the shape of the foot relates to stiffness, but they've concentrated on the medial longitudinal arch [the long one from the ball to the heel on the inside of the foot]." It's easy to comprehend the relationship between an arch's curve and foot stiffness if you grab a dollar bill. Lay the money flat and slightly curl its long edges so the middle bends up—as if forming a tube or highway tunnel. This creates an arch, running lengthwise down the bill. Push a finger on the middle of the bill's arch, and you'll notice some resistance or stiffness. Venkadesan's team wanted proof that a similar principle—that also explains why folding pizza makes it less floppy—was at work in our feet. "We had to come up with a way to test this idea in real feet," he says. So they designed a series of experiments in

Our short toes, for example, enable us to run long distances

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which they conducted bending tests on the feet of two human cadavers. In living humans, it's too difficult to isolate the role of the transverse arch because it works in sync with other foot parts. But in the cadaver feet, the researchers were able to remove the elastic tissue in between the long bones—called metatarsals—in order to directly measure the arch's impact on foot stiffness. The next step was to understand the role of the transverse arch in the context of human evolution. So Venkadesan's team developed a mathematical model to reconstruct the history of the human foot by comparing our current arch with fossils from extinct hominin species. Just as they suspected, the appearance of the transverse arch—which appeared in other hominins more than 3 million years before modern humans walked the earth—was an important element of bipedalism. The medial longitudinal arch followed—arriving 1.8 million years ago, to be precise. And the combo created the necessary stiffness that enabled us to eventually run marathons and take jumping pictures for social media. Experts say the new study is valuable because it's the first to quantify the stiffness of the transverse arch. "We've known about the presence of the transverse arch for a long time, but we've never had a way to measure it, and we didn't know how it affected the overall function of the foot," says Nicholas Holowka, an assistant anthropology professor at the University of Buffalo in New York who studies the evolution of the human foot. "This profoundly adds to our understanding of how the unique shape of the human foot enables our unique bipedal locomotion. So what does this research mean for flat-footed folk? The transverse arch is their supportive unsung hero. The flat-footed lack of a medial longitudinal arch can cause stress to other areas of the body and lead to foot pain. At one point, it was grounds for automatic rejection from the military. But Venkadesan's research sheds light on why the majority of flat-footed people don't suffer from chronic pain or injuries, Holowka says. "You can imagine you can have flat feet with a low longitudinal arch, but because you have a relatively high transverse arch, you can still have a stiff foot." Holowka says, adding that future research should examine any links between people's degrees of flat-footedness and their transverse arches. He is also calling for ways to quantify this transverse arch curvature in living people to better understand foot pain, which might be the key to building corrective orthotics. Other future research should look at the range of transverse arch anatomy among humans to probe the correlation between high curvature and high levels of stiffness, adds Glen Lichtwark, an associate professor in biomechanics at the University of Queensland in St Lucia, Australia. "You might have a high curve, but you might have a tradeoff somewhere else. Or you might use your muscles differently. We don't know these things yet," Lichtwark says. According to Lichtwark,

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who co-authored an accompanying article in *Nature*, this research has practical applications for foot health, including designing robotics and prosthetics and explaining the mystery why orthopedic surgeries provide pain relief for some patients and not others. Also in the future, shoe store employees might be able to scan your foot and provide personalized recommendations based on the total structure of your foot. "This research gives us another dimension of the complex structure of the foot," Lichtwark says. It highlights that the foot is three-dimensional, and we need to start to start thinking about it like that."

[nationalgeographic.com](https://www.nationalgeographic.com), 26 February 2020

~<https://www.nationalgeographic.com>

Scientists May Have Found Protein in a Meteorite, Which Means Space is Totally Yoked

2020-03-02

A trio of scientists believe they've identified the very first protein from outer space. They found the proteins in two meteorite samples, the Allende meteorite and the Acfer 086 meteorites, which researchers previously discovered in Mexico in 1969 and Algeria in 1990, respectively. The scientists—who hail from Harvard University, PLEX Corporation, and Bruker Scientific—posted the research to the preprint server ArXiv on February 22. Proteins were "discovered in Allende and Acfer 086 with extra-terrestrial isotope enhancement that confirmed that these unexpected molecules were not artifacts due to terrestrial contamination," they wrote. They dubbed the protein, which is similar to proteins commonly found on Earth, hemolithin. Naturally, we had the same question as you probably do: Does this mean we've found extraterrestrial life? Well, no. Proteins are among the *ingredients* for life. The organic molecules are made up of long strings of amino acids. But technically, they're not a sign of life as we know it. At the moment, there isn't a ton of information about this specific protein. The team isn't sure where the protein came from, or under what conditions it formed. (They suspect it probably formed alongside the solar system.) For nearly 50 years, researchers have been searching for and finding organic compounds like amino acids in meteorite samples—mostly carbonaceous chondrite meteorites. In 2012, NASA discovered amino acids in a carbonaceous meteorite, and in 2017, scientists found entirely new organic compounds in the famed Murchison meteorite. This is the first time scientists have discovered what amounts to an entire protein. Scientists and astronomers have long hypothesized that the ingredients for life may have landed on an early Earth, piggybacked on meteorites and

They dubbed the protein, which is similar to proteins commonly found on Earth, hemolithin

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asteroids that smashed into the planet. Finding a tiny protein tucked in a meteorite would certainly lend weight to that theory.

popularmechanics.com, 2 March 2020

<https://www.popularmechanics.com>

Pesticides cause 'permanent and irreversible' damage to baby bee brains

2020-03-04

Baby bumblebees develop abnormally when exposed to food contaminated with a certain type of pesticide, scientists have found. Researchers from the Imperial College London scanned the brains of bees exposed to imidacloprid, an insecticide with a similar chemical composition to nicotine. They found the key region of the brain that facilitates learning showed reduced growth in the insects exposed to imidacloprid. The researchers said the findings, published in the journal *Proceedings of the Royal Society B*, show that residues of this insecticide in flowers and plants can cause permanent brain damage in bees. Dr Richard Gill, from the department of life sciences at Imperial and the lead researcher on the study, said: "Bee colonies act as superorganisms, so when any toxins enter the colony, these have the potential to cause problems with the development of the baby bees within it. "Worryingly in this case, when young bees are fed on pesticide-contaminated food, this caused parts of the brain to grow less, leading to older adult bees possessing smaller and functionally impaired brains; an effect that appeared to be permanent and irreversible. "These findings reveal how colonies can be impacted by pesticides weeks after exposure, as their young grow into adults that may not be able to forage for food properly." Use of some insecticides like imidacloprid, which are also known as neonicotinoids, are restricted within the European Union but not around the world. The team exposed bumblebees to small amounts of imidacloprid during their development as larvae or very young adults. The learning ability of the larvae was tested after three days and after 12 days once they emerged as adults. Bees that were fed imidacloprid when they were developing as larvae showed "significantly impaired learning ability" compared to those that were not, the researchers said. The team then scanned the brains of nearly 100 bees from the different colonies. They found that baby bees exposed to imidacloprid during larval development had a smaller volume of the brain region associated with learning. The findings suggest the effects of larval exposure to the insecticide could not be overcome, the researchers said, pointing to a potentially permanent

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effect. Lead author [Dr Dylan Smith](#), also from the Imperial's life sciences department, added: "There has been growing evidence that pesticides can build up inside bee colonies." "Our study reveals the risks to individuals being reared in such an environment, and that a colony's future workforce can be affected weeks after they are first exposed."

scienceforus.com, 4 March 2020

<https://www.scienceforus.com>

The Clitoris, Uncovered: An Intimate History

2020-03-04

According to Greek mythology, the prophet Tiresias was harassing a pair of mating snakes when Hera decided to transform him into a woman as "punishment." After he had lived in this form for seven years, she changed him back. Later, when asked by Hera and Zeus to settle an argument over which sex has the most pleasure in intercourse (Hera thought men; Zeus said women), Tiresias replied, Women. Definitely women. For this impertinence, Hera struck him blind. Tiresias may have been just poking some fun at the almighty gods. Or he may have had a better understanding than most of that nerve-rich female pleasure center: the clitoris. In the history of sexual anatomy, the clitoris has long been dismissed, demeaned, and misunderstood. (Fun fact: when a French physician dissected this organ for the first time in 1545, he named it *membre honteux*—"the shameful member"—and declared its sole purpose to be urination. The earlier origins of the word are murky. Clitoris comes from the Greek *kleitoris*, which has been translated as both "little hill" and "to rub," suggesting an ancient play on words.) First off, it is not just some pea-sized nub. Around 90 percent of the clitoris's bulk lies beneath the surface. It is a sprawling underground kingdom of crackling nerves and blood-pumping vessels. Underneath the nub, called the glans clitoris, a plump wishbone shape encircles the vagina, with arms that flare out up to nine centimeters into the pelvis. And all of the parts beneath the surface are made of erectile tissue, meaning they swell with blood when aroused to become even bigger. And that under-the-surface bulk is brimming with connections. The clitoris is intimately entwined with all of the pelvic structures around it, including the urethra (the duct for urination), the vagina and the labia. This arrangement has implications in the bedroom, in the classroom and on the operating table. Understanding the full shape of the clitoris helps us to improve anatomy textbooks and better comprehend how female orgasm works. It also helps surgeons to spare crucial nerves during pelvic surgery, improve

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gender-affirmation procedures and repair the clitorises of women who have undergone female genital mutilation. What is crazy is that, starting with the ancient Greeks, it took humans more than 2,000 years to develop this understanding—despite the fact that about half of the population has a clitoris. Though female anatomy has not changed all that much, our understanding of it sure has. Throughout history, the clitoris has been lost, found and lost again, with male anatomists jostling one another over who deserves credit for its “discovery.” Yet the full clitoris is still inadequately portrayed in most anatomy textbooks. Fortunately, a few anatomical pioneers are working to change that. In 2005 Australian urologist Helen O’Connell thrust the full anatomy of the clitoris into the public eye. She used microdissection of cadavers and magnetic resonance imaging of living women to reveal what only a few brave anatomists had ever dared to point out. O’Connell compared the clitoris to an iceberg: beneath the surface, it was 10 times the size most people thought it was and boasted two to three times as many nerve endings as the penis. And its shape—part penguin, part insect, part spaceship—was a marvel that could only be appreciated in three dimensions. “There’s nothing quite like the shape of a clitoris,” O’Connell said in 2006. Today some anatomy teaching programs are starting to incorporate this expanded understanding of the organ once known as only a “little hill.” For the sake of women and men everywhere, here’s hoping this shape won’t be ignored any longer.

scientificamerican.com, 4 March 2020

<https://www.scientificamerican.com>

Why your travel insurance might not cover the coronavirus

2020-03-04

The global and domestic spread of the novel coronavirus has prompted travelers to reassess their travel plans through 2020. Already, airlines are canceling hundreds of flights, foreign cities are shutting down, and high-profile companies are asking employees to limit “non-essential” travel. These developments have many people wondering: Is it safe for me to travel overseas? Will I be able to get a refund for my trip if I back out? What happens if I get sick during a trip? Within the past week, several countries, including South Korea, Iran, Italy, and Japan, have been added to the Centers for Disease Control and Prevention’s growing travel advisory list since the outbreak began in Wuhan, China. A month ago, these countries appeared to be somewhat of a safe travel bet, but that’s changed. The World Health Organization has raised its risk assessment

If you’re hesitant to move forward with a trip at this point, most travel insurance won’t cover a cancellation, according to Squaremouth, a travel insurance comparison site

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to the highest level, as more than 60 countries have reported cases. Experts recommend travelers to consider the risk of the destination they're heading to and follow the advice of authoritative bodies, like the World Health Organization, the US State Department, or the Centers for Disease Control and Prevention, before making a decision. Jennifer Nuzzo, an infectious disease expert and senior scholar at the Johns Hopkins Center for Health Security, told Vox's Julia Belluz: "I'm more concerned about the unpredictability of the [outbreak] response at this point. It would not be fun to go to China and get stuck there somehow. And coming back, you'll be subject to additional screenings" or quarantines. If you're hesitant to move forward with a trip at this point, most travel insurance won't cover a cancellation, according to Squarmouth, a travel insurance comparison site. That's because travel insurance is "designed to cover unforeseen events," and Covid-19 is now considered a "foreseen event," unless you purchased it before a specific date, Squarmouth content director Steven Benna told me. "Most travelers generally look for a policy with cancellation benefits and emergency medical benefits that cover them while they're traveling," he said. "At this point, the only cancellation coverage available is the 'cancel for any reason' insurance, which is a time-sensitive upgrade." The "cancel for any reason" coverage usually has to be purchased within 21 days from the first payment for a trip, whether that be airfare or a hotel reservation, and can cost about 40 percent more than a standard trip cancellation insurance. However, the tradeoff might be worth it since "cancel for any reason" reimburses travelers up to 75 percent of their trip cost. To put it simply, the most basic travel insurance options are likely not offering refunds for the coronavirus — no matter how widespread the disease becomes. There are cases where you might get a trip refunded, but it'll only apply if you purchased the insurance before Covid-19 became a global threat (before late January, according to Benna). "Some providers do exclude epidemics or pandemics outright," Benna added. "Others have specific language that won't refer to whether or not something's a pandemic, but would have a foreseeability date whether something has an impact on travel." For those worried about contracting the disease on a trip, Benna said that some insurance packages still offer medical benefits for travelers, which includes emergency and medical evacuation coverage. The benefits would only apply for those who contract it during the trip, but currently, the coronavirus outbreak "is a unique situation and it varies," he added. If you've already purchased trip insurance for an upcoming vacation, the best thing you can do is read the fine print or call the insurance company to figure out what's covered under your policy. Every provider offers different insurance options that can vary depending on what you've selected, and it might not be too late to upgrade to a

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more comprehensive plan. But if you're determined to carry on with your vacation, remember: Consider the risks and check those travel advisories.

vox.com, 4 March 2020

<https://www.vox.com>

Ocean plastic: How recycling creates tomorrow's problems

2020-02-27

Sometimes plastic recycling is so much worse than just letting trash be trash. But first, let's thank European supermarket chain Lidl for trying. We all must. Plastic pollution is an enormous challenge. Unfortunately they, like many, are ignoring the toxic dimension of plastic recycling. Until efforts to solve the plastic crisis fully understand plastic toxicity, they risk making today's solutions into tomorrow's problems. And not just tomorrow's minor problems—we're talking societal-disruption and extinction-scale problems. Our research team this week found a story in The Daily Mail about Lidl's plan to wrap fish in plastic recycled from «ocean-bound plastic» collected off beaches in Southeast Asia. Sorry. It may be well-intentioned, but for someone who understands plastic toxicity, it's a horrifying idea. Here's why: Plastic contains many toxic substances. Scientists think about four sources:

1. The plastic itself

Some toxics come from the plastic itself: The basic building block that is the core of a plastic molecule is sometimes demonstrably toxic. Bad for babies. Bad for adults. Bad for libido. Bad for fertility, brain function and a lot of other adverse effects people care about. For example, BPA is widely used as the “monomer” that is connected in a chemical chain to make a polymer, the very definition of plastic. So are BPS and many other “BPA-free” alternatives. The monomer BPA (and BPS etc.) is a notorious endocrine disrupting chemical.

2. The additives

Some of the sources are additives (like phthalates that chemical engineers ooze into the plastic to force the plastic to attain specific characteristics, like softness or resistance to UV light or microbes). These additives aren't bound to the polymer so they ooze out of phthalate-softened PVC based Rubber Duckies. Just right for infants to suck on if your goal is to suppress sperm count once they become adults.

It may be well-intentioned, but for someone who understands plastic toxicity, it's a horrifying idea.

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3. The unintended ingredients

Then there is a complicated morass called "nonintentionally added substances (NIAS)." Some of these have been identified. Others we know are there but we don't know what they are. These usually are byproducts of reactions that take place as plastic is made. One problem is that to make plastic out of a feedstock that is absolutely 100% pure would be wildly expensive. So in the real world there are impurities. And these impurities react during the making of plastic to form NIAS. But other chemical processes produce NIAS even with pure feedstock. We know some NIAS are toxic, like formaldehyde and acetaldehyde in PET plastic. But for most we are ignorant. They could be safe, or they could be toxic.

4. The environment

Lastly, plastic materials absorb toxic substances from the environment, for example from ocean water. Some of these are notorious, like PCBs, DDT (still), dioxins, and others.

Ignorance about toxicity

The result is that virtually all plastics are likely to contain toxic ingredients, especially those taken from the ocean. Some may not, but they are never fully tested. A remarkable scientific study last year made clear how ignorant we are. After the basic finding that most plastic materials tested were toxic in one way or another, the most surprising finding in their work was that a widely acclaimed bio-based plastic was among the most toxic. Oops. In that case, it was probably due to the additives. While chemical engineers try to make food-grade plastic packaging material out of a jumble of old plastic picked off the beach, their products will unquestionably contain toxic chemicals. It's not something you want wrapped around your fish. Or finding its way into your fetus via food packaging. Very bad idea.

An epidemic of hormonally related diseases

What are some of these toxic substances? They are a litany of what doctors have identified as endocrine disrupting compounds, including bisphenols, phthalates and perfluorinated (or "forever") chemicals, PCBs, DDT (banned in the 1970s but, still, found everywhere). This nasty stuff is now associated with today's epidemic of hormonally related diseases, like type 2 diabetes, heart disease, obesity, infertility, ADHD and autism. And there are other types of toxicity imbedded in these plastics, as well: Carcinogenicity, oxidative stress, etc. Some of those beach plastics in Lidl's

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recycled packaging may be safe, although literally none (really, none) have been fully tested for safety. But some of them are definitely toxic. When you mix safe plastics with toxic plastics the recycled result is always toxic. And forget hiding behind the old adage that “the dose makes the poison.” Endocrine science has established that exceedingly small doses can have big effects.

Not safe for food?

That means programs like Lidl’s bring you food packaging that is unavoidably toxic. Unless they have tested each batch. In which case, Lidl, show us the data. Many of the plans to gather plastic from the ocean and make something out of it fall victim to this basic truth. Recycling possibly safe and toxic plastics together winds up with unquestionably toxic materials. We don’t want that in our food supply because stuff in packaging migrates into the food we eat. Plastic recycling solutions that don’t address the toxicity of the recycled product are part of future problems. Any entrepreneur or reporter who pretends otherwise is creating a serious problem for tomorrow.

A serious problem

And this is why it’s such a serious problem. The toxics in plastics are associated with declines in sperm counts so precipitous that the developed world may wind up with 4 out of 5 men infertile by 2040 or 1 out of 2 boys autistic by 2042. This is a problem we have to take seriously, despite the feel-good sense we get from short-term solutions. Lidl investors should beware of the financial exposure this creates for the company. As we begin to understand the long-term consequences of plastic exposures, Lidl on its current path will not be on the right side of science, or history.

ehn.org, 27 February 2020

<https://www.ehn.org>

The world is facing an air pollution pandemic

2020-02-03

While the world is rightfully concerned about COVID-19 turning into a full-blown pandemic in the coming days, scientists say another pandemic has already been underway, with much less attention, for years, bringing with it cardiovascular and respiratory diseases and causing nearly 10 million premature deaths just last year. The cause, according to a study published today by the European Society of Cardiology, is air pollution, mostly from

The cause, according to a study published today by the European Society of Cardiology, is air pollution, mostly from human-made sources, and it’s having dire public health effects worldwide.

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human-made sources, and it's having dire public health effects worldwide. It's become common knowledge that air pollution is harmful to our health—from exacerbating asthma to causing lung cancer—but breathing in dirty air has still been seen mostly as a minor inconvenience of modern living, something to just deal with rather than address like we have with smoking or preventable diseases such as HIV/AIDS. Researchers from the Max Planck Institute for Chemistry and the Department of Cardiology of the University Medical Centre Mainz in Germany, whose study was published today in the journal *Cardiovascular Research*, hope their findings will prompt cardiologists around the world to take this threat seriously. Looking at air pollutant exposure data from the Global Exposure Mortality Model and World Health Organization mortality and population information, the researchers estimate that air pollution caused an extra 8.8 million premature deaths worldwide in 2015—more than tobacco smoking (7.2 million premature deaths per year globally); HIV/AIDS (one million deaths); parasitic diseases such as malaria (600,00 premature deaths); and all forms of violence, from interpersonal violence to deaths in wars (530,000 premature deaths). Air pollution's mortality rate represents an average shortening of life expectancy of nearly three years for every person in the world. Air pollution may not initially seem that harmful, and in some countries air pollution concentrations have certainly decreased, notes study author Jos Lelieveld. But in low- and middle-income countries, pollution levels continue to grow, and this study links that pollution with life expectancy loss from lower respiratory tract infection, chronic obstructive pulmonary disease, lung cancer, heart disease, and cerebrovascular disease leading to stroke. "People are exposed [to air pollution] 365 days per year, a lifetime long," Lelieveld says. "It is a chronic exposure that leads to chronic diseases." The study distinguishes between human-made air pollution and unavoidable pollution from natural sources such as desert dust or wildfires. Globally, two-thirds of all premature pollution deaths are attributable to human-made pollution, which is mainly fossil-fuel related. That means 5.5 million deaths worldwide a year are potentially avoidable, the researchers say. It also means different regions see different health impacts because of how pollution-related emissions can vary. Worldwide, ambient air pollution's life-shortening effect is greatest for older people, with 75% of deaths attributed to air pollution occurring in people over 60 years old, per the study. But in low-income regions such as Africa and South Asia, air pollution is linked with high mortality for children under five. East Asia has the highest loss of life expectancy—3.9 years—associated with avoidable air pollution; removing human-made emissions could prevent three of those 3.9 years of lower life expectancy. Because experts are seeing mortality numbers rise, more

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health impacts of air pollution are being identified, and air pollution is increasing in many countries, “the term ‘pandemic’ seems appropriate,” Lelieveld says. “The takeaway message is that ambient air pollution is one of the main global health risks, causing significant excess mortality and loss of life expectancy, especially through cardiovascular diseases.”

fastcompany.com, 3 February 2020

<https://www.fastcompany.com>

Earth has acquired a brand new moon that’s about the size of a car

2020-02-26

Earth might have a tiny new moon. On 19 February, astronomers at the Catalina Sky Survey in Arizona spotted a dim object moving quickly across the sky. Over the next few days, researchers at six more observatories around the world watched the object, designated 2020 CD3, and calculated its orbit, confirming that it has been gravitationally bound to Earth for about three years. An [announcement](#) posted by the Minor Planet Center, which monitors small bodies in space, states that “no link to a known artificial object has been found”, implying that it is most likely an asteroid caught by Earth’s gravity as it passed by. This is just the second asteroid known to have been captured by our planet as a mini-moon – the first, [2006 RH120](#), hung around between September 2006 and June 2007 before escaping. Our new moon is probably between 1.9 and 3.5 metres across, or roughly the size of a car, making it no match for [Earth’s primary moon](#). It circles our planet about once every 47 days on a wide, oval-shaped orbit that mostly swoops far outside the larger moon’s path. The orbit isn’t stable, so eventually 2020 CD3 will be flung away from Earth. “It is heading away from the Earth-moon system as we speak,” says Grigori Fedorets at Queen’s University Belfast in the UK, and it looks likely it will escape in April. However, there are several different simulations of its trajectory and they don’t all agree – we will need more observations to accurately predict the fate of our mini-moon and even to confirm that it is definitely a temporary moon and not a piece of artificial space debris. “Our international team is continuously working to constrain a better solution,” says Fedorets.

newscientist.com, 26 February 2020

<https://www.newscientist.com>

On 19 February, astronomers at the Catalina Sky Survey in Arizona spotted a dim object moving quickly across the sky

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Privacy activists plan to auction off Trump, other world leaders' DNA

2020-02-18

An anonymous group of digital privacy activists calling itself the Earnest Project claims that it gathered DNA samples from a long list of world leaders — and plans to auction it off. The group says it got the genetic samples by collecting scooped up things like loose hairs, used utensils and wine glasses, and other objects from the 2018 World Economic Forum in Davos, Switzerland, according to OneZero. By auctioning off the items, which can be viewed in an online catalog, the Earnest Project wants to raise awareness of how everyday people's personal information is routinely monetized, bought, and sold without their knowledge. The samples allegedly contain DNA from people like:

- President Trump
- German Chancellor Angela Merkel
- French President Emmanuel Macron
- and Israeli Prime Minister Benjamin Netanyahu.

Just, you know, to name a few. "By collecting and selling vital and sensitive data harvested from the most powerful people on the planet, we hope to encourage a visceral reaction against surveillance capitalism among the elite," an Earnest Project representative told *OneZero*. "We're all constantly depositing our DNA around us and on discarded items. Once you start paying attention, it's really quite easy to collect a target's DNA." The Earnest Project originally wanted to hold its auction on Thursday, but told *OneZero* it was postponing for unspecified legal issues (which, if you're auctioning off various world leaders' DNA, should probably not come as a surprise). However, U.S. genetic privacy laws are surprisingly lax. The Earnest Project would run into legal trouble if they had actively swiped Davos attendees' DNA, *OneZero* reports, perhaps by plucking their hair or prodding them with a cheek swab. "But if they discard it, that's considered to be abandonment," Brad Malin, a genetic privacy expert at Vanderbilt University, told *OneZero*. "Technically, you're surrendering your rights at that point."

futurism.com, 18 February 2020

~shttps://www.futurism.com

"We're all constantly depositing our DNA around us and on discarded items. Once you start paying attention, it's really quite easy to collect a target's DNA."

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Would you eat a 'steak' printed by robots?

2020-02-25

You might not know it, but if you wear a hearing aid, you are likely to be part of the 3D printing revolution. Almost all hearing aids nowadays are produced using the technique. Also known as additive manufacturing, 3D printing involves building up layers of material - plastic, metal or resin - and bonding them together, until eventually you have the finished product. "Previously, production had been the sole preserve of modellers who finished each unique piece by hand in a time-consuming and costly process," says Stefan Launer, a senior vice president at Sonova, which makes hearing aids. "Now, once an order is placed, it takes just a few days for the finished product to be delivered, and the customer receives a hearing aid with individual fit," he says. When 3D printing began to emerge 20 years ago, its boosters promised that it would revolutionise many industries. And in many ways it has been a big success. In 2018, 1.4 million 3D printers were sold worldwide, and that is expected to rise to 8 million in 2027, according to Grand View Research. "In terms of the technology, there are constantly new applications discovered, with new materials and machines unveiled each year," says Galina Spasova, senior research analyst at IDC Europe. The technique has "revolutionised" the dental sector, she says, cutting the time it takes to make crowns and bridges, as well as making them more accurately. On a bigger scale, Boeing is using 3D-printed parts in its spacecraft, commercial and defence aircraft, while BAE Systems uses the technology to make components for the Typhoon fighter. There is even a 3D printer on the International Space Station, where it is used to create spare parts. But many applications are still on a smaller, experimental scale. For example, food can be 3D printed. Barcelona-based Nova Meat recently unveiled a plant-based steak derived from peas, rice, seaweed and other ingredients. Using 3D printing allows the ingredients to be laid down as a criss-cross of filaments, which imitate the intracellular proteins in muscle cells. "This strategy allows us to define the resulting texture in terms of chewiness and tensile and compression resistance, and to mimic the taste and nutritional properties of a variety of meat and seafood, as well as their appearance," says Guiseppe Scionti, the founder of Nova Meat. By next year, he says, restaurants could be printing out the steaks for themselves. One of the most exciting fields for 3D printing is medicine. For some time now, medical professionals have been 3D printing prosthetics, which can be made for a fraction of the usual price. They can also be easily personalised for the individual patient - indeed, earlier this year a cat in Russia was given four 3D-printed titanium feet after losing its own to frostbite. Medicines can be 3D printed

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- something that's particularly useful when treating small children, who need lower drug doses as standard. As co-director at NIHR Alder Hey Clinical Research Facility for Experimental Medicine professor Matthew Peak points out, "The majority of medicines available to children have not been designed with children in mind or, indeed, tested in clinical trials involving children." Last year, his team became the first in the world to give a child a 3D-printed pill; meanwhile, other researchers are creating pills that are personalised for the individual patient. Perhaps most extraordinary of all is the work being done to 3D print human organs. Researchers at Rensselaer Polytechnic Institute in the US recently announced that they'd developed a way to 3D print living skin, complete with blood vessels, that could be used as a graft for burn victims. There are still hurdles to overcome - the technique has been used only on mice so far, and work needs to be done to make sure the grafts aren't rejected. But, says associate professor Pankaj Karande, once grafted onto a special type of mouse, the vessels from the printed skin were able to connect with the mouse's own vessels. "That's extremely important, because we know there is actually a transfer of blood and nutrients to the graft which is keeping the graft alive," he says. Some hope the technology can be used on a much bigger scale. "We believe 3D printing houses and buildings will change the way the world is built," says Kirk Andersen, chief engineer of New York firm SQ4D. Earlier this year, his firm built a 1,900 square foot house in just eight days, by using a robot to build up the walls layer-by-layer. The roof still has to be built by construction workers. The process "drastically" reduces the amount of material and labour costs used in construction, according to Mr Anderson. The firm estimates that its house costs 70% less to build than an equivalent property built using traditional methods. The technology is still under development, but a number of 3D-printed buildings have been **completed around the world**, giving a sense of what could one day be possible. While 3D printing is common in car making and aerospace where the technique is valued for making prototypes, tools and parts, most of the items you buy are likely to be mass produced on production lines for some time to come.

bb.com, 25 February 2020

<https://www.bbc.com>

Brain scans showed increased brain activity when dogs were shown objects that were warmer than their surroundings.

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Dogs can detect heat with 'infrared sensor' in their nose, research finds

2020-03-04

BUDAPEST (Reuters) - Dogs have a type of infrared sensor in the tip of their nose which enables them to detect minute changes in temperature such as when other animals are nearby, according to new research. Scientists at Sweden's Lund University and Hungary's Eotvos Lorand University say the discovery can help better understand how predators detect their prey when other senses such as sight, hearing or smell are hindered. In their study printed in *Scientific Reports*, a journal published by Nature Research, scientists found that the naked, wet skin surface at the tip of a dog's nose, which is full of nerve endings, worked as an infrared sensor. "Dogs are able to sense the thermal radiation coming from warm bodies or weak thermal radiation and they can also direct their behavior according to this signal," said Anna Balint, lead author of the study. "We tested whether we can find an area in the brain that shows higher activity if they are exposed to a warmer than to a colder object," she said. Brain scans showed increased brain activity when dogs were shown objects that were warmer than their surroundings. "It is possible that other carnivorans possess a similar infrared sense and that adds a new chapter to the story of prey-predator relationships," said Ronald Kroger, a sensory scientist at Lund University. "Predator hunting strategies have to be re-evaluated and the biology of prey animals has to be revisited with body heat sensing predators in mind," he added. Among the dogs involved in the test were golden retrievers and border collies.

reuters.com, 4 March 2020

<https://www.reuters.com>

Clariant's New Partnership to Develop PE Compounds Based on Recycled OBP

2020-02-28

Clariant in collaboration with **Lavergne** has developed halogen-free flame-retardant polyester compounds made from ocean-bound plastic (OBP) waste. With the first grade already commercialized, the advance is supporting demand from major electrical and electronics brand owners for flame retarded post-consumer recyclate grades for equipment parts.

[Creating New Uses for Recycled Plastics](#)

The fully recyclable OBP-based compound has already successfully passed molding trials at part manufacturers and is commercially available

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The collaboration arises from the Lavergne's wider mission to create new uses for plastic, in this case polyethylene terephthalate (PET), recycled from ocean-bound waste streams. OBP refers to plastic waste that is recovered from the over 8 million metric tons of plastic currently entering the oceans each year. The first new flame-retardant compound Lavergne VYPET™ OBP-FR has 30 percent glass fiber reinforcement and UL 94 V-0 flame rating at 0.8 mm thickness, which makes it suitable for many electric and electronic (E&E) plastic applications, like aesthetic and structural parts. The fully recyclable OBP-based compound has already successfully passed molding trials at part manufacturers and is commercially available.

Exolit OP Flame Retardants - Contributing to Circular Plastic Economy

Clariant's flagship halogen-free Exolit OP flame retardants, were chosen for their proven excellent environmental and health profile, as documented by the Clariant EcoTain® label and a GreenScreen Benchmark 3 assessment for the key phosphinate ingredient. Adding to the circularity of the innovation, Exolit OP grades have been confirmed as suitable for various recycling processes without losing their flame-retardant properties. Furthermore, as a contribution to less fossil resource consumption, Clariant announced in October 2019 that selected Exolit OP grades will also become available as 'Terra' types, based on renewable carbon sources. Intensive liaison and development work were required by Lavergne's and Clariant's experts to develop the right flame retardant and synergist formulation for this resin grade and optimize the processing conditions of the compound. In fact, mechanical properties of OBP recyclates pose specific challenges because the repeated thermal treatment of polymers tends to progressively degrade the material. Because of the original compound's success, the solution has now been extended to more than a dozen product lines, with each program undergoing additional testing prior to commercialization.

Turing Plastic Wastes into High-end Products

The joint project took more than a year to come to fruition, and both parties are eager to continue their working relationship. "Lavergne is the right place for plastics, not the oceans. We clean the oceans of plastics and turn the plastic wastes into high-end products. I am proud to be a part of Lavergne Green Innovation Team" said Davood Bagheri, polymer scientist at Lavergne. "By using Clariant's Exolit OP flagship halogen-free phosphinate flame retardants in Lavergne's recycled OBP blends, both companies have successfully brought to life the potential commercial impact of sustainability!"

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This development reinforces Clariant's continuing commitment to developing sustainable additives which, through value chain collaboration, can help bring plastics into a circular, more resource-efficient economy," said Subra Narayan, technical market manager for Clariant flame retardants in North America. Clariant's collaboration with Lavergne also demonstrates its EcoCircle in action, a corporate-wide initiative supporting the transition from a one-way plastics value chain to a circular plastics economy together with partners from the entire value chain.

Minimizing Carbon Footprint by Using Recyclates

"By using VYPET™ OBP compounds, we help manufacturers to reduce significantly the plastic carbon footprint. And this is only the beginning." said Yoan Lavergne, marketing manager at Lavergne. The project to develop flame-retardant recyclate grades ties up with the support of major electronics brand owners (OEMs) and their demand for post-consumer recyclates. The use of recyclates is part of sustainability claims by OEMs and is rewarded in ecolabel schemes like the American EPEAT and German Blue Angel. OEMs are also supporting the sourcing of OBP by sponsoring collection and clean-up of waste. Whereas the applications targeted originally were fewer demanding components like packaging trays, the end uses for recyclates are now spreading to other structural parts of electronics equipment.

omnexus.specialchem.com, 28 February 2020

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

Deadly ciruses are no match for plain, old soap—here's the science behind it

2020-03-09

Why does soap work so well on the new coronavirus and, indeed, most viruses? Because it is a self-assembled nanoparticle in which the weakest link is the lipid (fatty) bilayer. That sounds scientific. Let me explain. Soap dissolves the fat membrane, and the virus falls apart like a house of cards and "dies," or rather, it becomes inactive as viruses aren't really alive. Viruses can be active outside the body for hours, even days. Disinfectants, or liquids, wipes, gels and creams containing alcohol (and soap) have a similar effect but are not as good as regular soap. Apart from alcohol and soap, antibacterial agents in those products don't affect the virus structure much. Consequently, many antibacterial products are basically just an expensive version of soap in how they act on viruses. Soap is the best, but

Disinfectants, or liquids, wipes, gels and creams containing alcohol (and soap) have a similar effect but are not as good as regular soap

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alcohol wipes are good when soap is not practical or handy, for example in office reception areas.

Supramolecular chemistry

But why, exactly, is soap so good? To explain that, I will take you through a journey of supramolecular chemistry, nanoscience and virology. I will try to explain this in generic terms, which means leaving out special chemistry terms. (I must point out that, while I am an expert in supramolecular chemistry and the assembly of nanoparticles, I am not a virologist.) I have always been fascinated by viruses, as I see them as one of the most spectacular examples of how supramolecular chemistry and nanoscience converge. Most viruses consist of three key building blocks: RNA, proteins and lipids. The RNA is the viral genetic material — it is similar to DNA. The proteins have several roles, including breaking into the target cell, assisting with virus replication and basically being a key building block (like a brick in a house) in the virus structure. The lipids then form a coat around the virus, both for protection and to assist with its spread and cellular invasion. The RNA, proteins and lipids self-assemble to form the virus. Critically, there are no strong “covalent” bonds holding these units together. Instead, the viral self-assembly is based on weak “non-covalent” interactions between the proteins, RNA and lipids. Together, these act together like Velcro, so it is hard to break up the self-assembled viral particle. Still, we can do it — with soap! Most viruses, including the coronavirus, are between 50-200 nanometers — so they truly are nanoparticles. Nanoparticles have complex interactions with surfaces they are on; it’s the same with viruses. Skin, steel, timber, fabric, paint and porcelain are very different surfaces. When a virus invades a cell, the RNA “hijacks” the cellular machinery like a computer virus and forces the cell to make fresh copies of its own RNA and the various proteins that make up the virus. These new RNA and protein molecules self-assemble with lipids (readily present in the cell) to form new copies of the virus. That is, the virus does not photocopy itself; it makes copies of the building blocks, which then self-assemble into new viruses. All those new viruses eventually overwhelm the cell, and it dies or explodes, releasing viruses that then go on to infect more cells. In the lungs, viruses end up in the airways and mucous membranes. When you cough, or especially when you sneeze, tiny droplets from the airways can fly up to 30 feet. The larger ones are thought to be main coronavirus carriers, and they can go at least 7 feet. So, cover your coughs and sneezes!

Skin is an ideal surface for viruses

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These tiny droplets end up on surfaces and dry out quickly. But the viruses are still active. What happens next is all about supramolecular chemistry and how self-assembled nanoparticles (like the viruses) interact with their environment. Now it is time to introduce a powerful supramolecular chemistry concept that effectively says: Similar molecules appear to interact more strongly with each other than dissimilar ones. Wood, fabric and skin interact fairly strongly with viruses. Contrast this with steel, porcelain and at least some plastics, such as Teflon. The surface structure also matters. The flatter the surface, the less the virus will “stick” to the surface. Rougher surfaces can actually pull the virus apart. So why are surfaces different? The virus is held together by a combination of hydrogen bonds (like those in water) and hydrophilic, or “fat-like,” interactions. The surface of fibers or wood, for instance, can form a lot of hydrogen bonds with the virus. In contrast, steel, porcelain or Teflon do not form much of a hydrogen bond with the virus. So the virus is not strongly bound to those surfaces and is quite stable. For how long does the virus stay active? It depends. The novel coronavirus is thought to stay active on favorable surfaces for hours, possibly a day. What makes the virus less stable? Moisture (“dissolves”), sunlight (UV light) and heat (molecular motions). The skin is an ideal surface for a virus. It is organic, of course, and the proteins and fatty acids in the dead cells on the surface interact with the virus through both hydrogen bonds and the “fat-like” hydrophilic interactions. So when you touch a steel surface with a virus particle on it, it will stick to your skin and, hence, get transferred on to your hands. But you are not (yet) infected. If you touch your face, though, the virus can get transferred. And now the virus is dangerously close to the airways and the mucus-type membranes in and around your mouth and eyes. So the virus can get in and — voila! — you are infected. That is, unless your immune system kills the virus. If the virus is on your hands, you can pass it on by shaking someone’s else hand. Kisses, well, that’s pretty obvious. It goes without saying that if someone sneezes in your face, you’re stuck. So how often do you touch your face? It turns out most people touch the face once every two to five minutes. So you’re at high risk once the virus gets on your hands, unless you wash off the active virus. So let’s try washing it off with plain water. It might just work. But water “only” competes with the strong “glue-like” interactions between the skin and virus via hydrogen bonds. The virus is sticky and may not budge. Water isn’t enough.

Soap dissolves a virus’ structure

Soapy water is totally different. Soap contains fat-like substances known as amphiphiles, some structurally similar to the lipids in the virus membrane.

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The soap molecules “compete” with the lipids in the virus membrane. That is more or less how soap also removes normal dirt of the skin (see graphic at the top of this article). The soap molecules also compete with a lot other non-covalent bonds that help the proteins, RNA and the lipids to stick together. The soap is effectively “dissolving” the glue that holds the virus together. Add to that all the water. The soap also outcompetes the interactions between the virus and the skin surface. Soon the virus gets detached and falls apart like a house of cards due to the combined action of the soap and water. Boom, the virus is gone! The skin is rough and wrinkly, which is why you need a fair amount of rubbing and soaking to ensure the soap reaches every nook and cranny on the skin surface that could be hiding active viruses. Alcohol-based products include all “disinfectants” and “antibacterial” products that contain a high share of alcohol solution, typically 60%-80% ethanol, sometimes with a bit of isopropanol, water and a bit of soap. Ethanol and other types of alcohol do not only readily form hydrogen bonds with the virus material but, as a solvent, are more lipophilic than water. Hence, alcohol does dissolve the lipid membrane and disrupt other supramolecular interactions in the virus. However, you need a fairly high concentration (maybe 60%-plus) of the alcohol to get a rapid dissolution of the virus. Vodka or whiskey (usually 40% ethanol) won't dissolve the virus as quickly. Overall, alcohol is not as good as soap at this task. Nearly all antibacterial products contain alcohol and some soap, and that does help kill viruses. But some also include “active” bacterial killing agents, such as triclosan. Those, however, do basically nothing to the virus.

Alcohol works — to a degree

To sum up, viruses are almost like grease-nanoparticles. They can stay active for many hours on surfaces and then get picked up by touch. Then they get to our face and infect us because most of us touch our face frequently. Water is not effective alone in washing the virus off our hands. Alcohol-based products work better. But nothing beats soap — the virus detaches from the skin and falls apart readily in soapy water. Supramolecular chemistry and nanoscience tell us not only a lot about how the virus self-assembles into a functional, active menace, but also how we can beat viruses with something as simple as soap.

marketwatch.com, 9 March 2020

<https://www.marketwatch.com>

The patient was one of two people who together formed a missing link between two clusters of cases that each occurred in a Singaporean church

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Singapore claims first use of antibody test to track coronavirus infections

2020-02-27

In what appears to be a first, disease trackers in Singapore have used an experimental antibody test for COVID-19 to confirm that a suspected patient was infected with the coronavirus. The patient was one of two people who together formed a missing link between two clusters of cases that each occurred in a Singaporean church. Researchers around the world are racing to develop antibody tests , also called serological tests, that can confirm whether someone was infected even after their immune system has cleared the virus that causes COVID-19. The group that developed the test, at Duke-NUS Medical School in Singapore, is among the front-runners, although its assay has to be validated before it is taken into production and deployed widely. Current tests for SARS-CoV-2, the virus that causes COVID-19, look for genetic material of the virus, for instance in saliva or nasal, oral, or anal swabs, using the polymerase chain reaction (PCR). They have one huge drawback: They only give a positive result when the virus is still present. The tests can't identify people who went through an infection, recovered, and cleared the virus from their bodies. The new antibody test helped contact tracers at Singapore's health ministry who have been trying to find the source of a cluster of 23 COVID-19 cases at the Grace Assembly of God church, which has two large houses of worship in the city-state. Health ministry contact tracers had identified the primary case, a 28-year-old man who fell ill on 29 January. But they could not determine how he became infected. The other cluster of cases started during a service at the Life Church and Missions, a small, independent evangelical congregation, and was apparently "seeded" by visitors from Wuhan, China, on 19 January. Contact tracers found a possible link: The index case at Grace Assembly of God had attended a Lunar New Year celebration on 25 January along with a couple who had attended a church service with the Wuhan visitors. The Life Church couple both developed symptoms and sought medical advice around 25 January, but they were not diagnosed as COVID-19 patients because of their mild symptoms. After discovering the Lunar New Year celebration link, investigators sent the couple to the National Center for Infectious Diseases for tests on 18 February. Because some time had already elapsed since they had recovered, specialists thought they had likely cleared the virus and it would be too late to confirm an infection using the PCR test. So, they tested the couple using both PCR and antibody tests. Unexpectedly, the husband tested positive by PCR; he was hospitalized in isolation the next day. His wife's PCR test was negative,

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but the antibody test results, available several days later, showed she had antibodies, as did her husband. “We believe this is the first time in the world where these particular tests have been used in this context” of contact tracing, virologist Danielle Anderson of Duke-NUS said during a Tuesday briefing. Researchers are eagerly awaiting serological testing, not just to follow the virus’s path. “It will allow us to trace in a much more population-based way who has had the infection,” says Nigel McMillan, an infectious disease specialist at Griffith University, Gold Coast. For instance, “Many cases seem to be spread from asymptomatic patients who we can’t identify easily.” Serological tests are “essential to better understand the epidemiology of COVID-19,” says Keiji Fukuda, an epidemiologist at the University of Hong Kong. The test was developed by a team led by Linfa Wang, an emerging disease specialist at Duke-NUS. In blood samples from recovered patients, the team identified antibodies targeting the spike protein that proved able to block the virus from killing cells in laboratory tests. In parallel, they created synthetic viral proteins that can detect those antibodies in a blood sample without having to use the live virus. Serological assays need to be carefully validated to be sure they react reliably, but only to antibodies against the novel virus, says Bart Haagmans of Erasmus Medical Center, whose group is working on serological tests itself in collaboration with Utrecht University. Indeed, one concern was that the similarity between the viruses that cause severe acute respiratory syndrome and COVID-19 could lead to cross-reactivity, Wang says. But the newly developed test can distinguish the two viruses with high accuracy and confidence, he says. Elsewhere, development of serological tests is advancing rapidly. A group at the Wuhan Institute of Virology in China used an in-house test to show that serologic testing can be used to confirm infections, a paper published online on 17 February in *Emerging Microbes & Infections* shows. The technology has been commercialized, team member Peng Zhou wrote in an email, but it’s not clear how widely it has been used. EUROIMMUN, a diagnostics manufacturer, announced on 21 February that it has developed tests to detect COVID-19 virus antibodies, but its product has yet to be approved. Singapore has not had the explosive spike in case numbers seen in many other countries, possibly because of its aggressive contact tracing effort and legal authority to order people into quarantine. As of 26 February, the city had a total of 93 confirmed cases; 2848 close contacts have been quarantined for 2 weeks.

sciencemag.org, 27 February 2020

<https://www.sciencemag.org>

For a city to be truly smart, it needs to be able to do something with the data, to connect people to economic opportunity, entertainment and education

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Opinion: If We Want Smart Cities, We Need To Double Down On Rail Transit

2020-02-28

There's a lot of discussion and excitement these days about the concept of "smart cities." While the prospect of having more technology infused in a city's operations could be very exciting, the most important aspect will continue to be transportation. More specifically, I am referring to public transportation. When was the last time that it took you 20 minutes to travel 2 miles (3 kilometers)? If you live in a city, it was probably not all that long ago. This is the effect of urbanization. And with growing urbanization, there is a growing need for convenient and reliable public transportation. A smart city is one that uses the Internet of Things to sense and collect data. But when a city talks about getting "smarter," it's not enough to just have a lot of data (though that is still very important). For a city to be truly smart, it needs to be able to do something with the data, to connect people to economic opportunity, entertainment and education. And to each other. Urbanization has been increasing over the past few centuries and today, more than half of the world's population lives in cities. It is estimated that by 2050, roughly two-thirds of the world's population will reside in cities. That translates to approximately 6.7 billion people (of an estimated global population of 9.8 billion), all who will need transportation. With individualized car transportation already causing too much congestion and pollution, the solution cannot be more cars. The way we see it, cars cannot be the future backbone of urban traffic. It has to be public transit — more importantly, it has to be rail. Rail remains one of the most eco-friendly transportation modes that we have. Some light rail is even "zero-emission" in cities that have committed to using an electrified rail infrastructure, and we're seeing the potential for more environmental benefits as we start moving toward alternative power for trains like batteries or fuel cells. In areas that do not have access to rail, which is often in that "last mile" of a person's suburban commute, autonomous taxis and shuttles could cover the last mile between homes and public transportation or long-distance transport hubs, eventually making private cars surplus in cities. Importantly, they can be supported and adjusted by roadside technology that records and monitors traffic, as well as the condition of possible unexpected events on the roads. Bottom of Form

Many cities are already designed around some type of proven central rail network. Take New York's Grand Central Terminal, where you can transfer to and from buses, subways, taxis and private vehicles to interstate commuter rail like the Long Island Rail Road and Metro-North. New York's Penn Station also provides commuters similar multimodal to New Jersey

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Transit, and is a key stop on Amtrak's renowned Northeast Corridor, the most heavily traveled rail route in the country joining major metropolitan areas between Boston and Washington, D.C. We believe a robust, rail-centric network should remain the backbone or center point into which other transportation modes, like autonomous shuttles, ride-sharing, bikes and scooters, can feed into and around — providing a true seamless end-to-end journey for today's commuter. With the reliability and availability of the entire transportation ecosystem now further enhanced by artificial intelligence-based services, public transit capacity is increasing by automated train operation and its convenience is being enhanced by user apps that provide accurate updates for vehicle availability, connections and routing. We want to be smarter — but it's not enough to just keep throwing software at our existing transportation network. We need to take a step back, reinvest and build out a future transportation network — which we believe should be rail-based — while taking advantage of the new digital technologies that will ensure that these networks are sustainable over the long term. Now *that* would be the smart thing to do.

ensia.com, 28 February 2020

<https://www.ensia.com>

A remedy for harmful algal blooms? Scientist thinks he's found one

2020-02-03

Covering the entire 40 acres of Lake Newport was a thick, green mat of algae. Looking across the lake in Youngstown, Ohio, last September, Peter Moeller, a government researcher, wondered if his experimental treatment could heal the lake by removing the toxin-producing cyanobacteria. In the sweltering heat, beads of sweat dripped down the faces of Moeller and his team as they positioned four units of nanobubble ozone generators around the lake shore. Each unit looked like two boxes, roughly three feet long and wide, and was powered by an electric generator. Wearing waders, the crew arranged the tubes stretching from the generators to the lake. Soon, white streaks appeared in the water as the ozone-filled bubbles entered and broke down the algae. After the machines ran for five days straight, the lake was crystal clear and returned to its natural state. "The fish were active, and it was awesome, you couldn't have asked for a better scene," Moeller said. Moeller is a National Oceanic and Atmospheric Administration scientist based in South Carolina at the Hollings Marine Laboratory. He is using nanobubble ozone technology (NBOT) as a promising new approach to address harmful algal blooms,

After the machines ran for five days straight, the lake was crystal clear and returned to its natural state.

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which are overgrowths of toxin-producing algae. A global increase in algal bloom intensity has occurred over the past 40 years, according to a [2019 *Nature* study](#). The authors, researchers at Stanford and NASA, believe rising temperatures and increased nutrient input, like nitrogen and phosphorous, may be responsible. In 2017, one of the Stanford authors determined that increased precipitation due to climate change will [increase nutrient input](#) in water by about 19 percent for the United States in the 21st century. The toxic algae are dangerous because it is impossible to distinguish from harmless algae by eye. According to the [Centers for Disease Control and Prevention](#), coming into contact or breathing in the aerosolized toxins can lead to skin, respiratory, and neurological issues. In addition to impacting recreational activities, such as swimming and fishing, harmful algal blooms can contaminate food and water sources. In 2014, [more than 400,000 Toledo, Ohio, residents](#) were ordered not to use their water because of Lake Erie's algal bloom. Moeller has been a lead toxin chemist for more than 25 years. He has also appeared in the news in [2007](#) and [2013](#) for his work identifying and characterizing new toxins that pose environmental and health threats. His plans to bubble ozone through algae-infested lakes has attracted both supporters and skeptics. «There is much to learn in respect to the health of fish and other aquatic life and their relationship to this material, as well as refining the techniques of dosing systems,» said Tim Wood, President of Society of Lake Management Professionals. Still, Nick Derico, natural resources steward in Youngstown who witnessed the Lake Newport ozonation, said of NBOT, «I'm definitely hopeful for the future, as I'm sure we'll be seeing more of it.» Municipal water treatment plants often use chemicals to treat algal blooms, such as [copper sulfate](#) and [aluminum sulfate](#), or alum. According to Kelly Frey, head of the Ohio Ottawa County Sanitary Engineering Department, these practices have downsides. Copper sulfate kills cyanobacteria, but simultaneously induces toxin release. Aluminum sulfate precipitates and builds up at the bottom of lakes, harming animals. Water treatment plants and private well owners have used [ozone as a disinfectant](#), too, but using it to clean entire lakes is new. To treat lakes with ozone, Moeller is using a combination of NBOT machines that take in oxygen from the air, generate ozone, and release ozone filled nanobubbles into the water. Since nanobubbles do not float, the bubbles remain underwater and release ozone, a strong oxidant that damages the cell wall of algae and breaks down the chemical bonds of their toxins. However, Moeller said NBOT is safe for humans and fish because researchers add ozone only at concentrations targeting microbes and not larger. "Fish are running into natural ozone in far greater concentrations," said Moeller, "and we know that if values are below certain

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bars, nothing else will be affected." In other words, he said not enough ozone is added to remove all toxic organisms or beneficial phytoplankton, but enough ozone is added to reduce the amount of harmful algae to much lower levels that make the microorganisms less of a threat to people. Furthermore, ozone breaks down into oxygen and improves water quality by replenishing the oxygen stolen from animals by algae. "NBOT provides a green, longer term solution," said Moeller, but will need to be reapplied until the decades of nutrient run-off in lakes is decreased. So far, Moeller's work has cleaned [Florida's Port Mayaca Lock and Dam](#) last August and Ohio's Lake Newport last September. To safely put NBOT on the market, Moeller partnered with Green Water Solutions, LLC, a water purification company using nanobubble technology, through a [Cooperative Research and Development Agreement](#). The company administered NBOT for free, to test the technology's potential, both at Lake Newport and at Port Mayaca. For the Lake Newport test, Derico, Youngstown natural resource manager, confirms no lake animals were harmed and the algae subsided but said the couple inches of rainfall and constant flux of lake water should be considered. Chas Antinone, Jr., President of Green Water Solutions, said the preliminary results show significant reductions of algae, toxins, and nutrient levels for both test sites. With the promising effects of NBOT, Florida is keen on trying NBOT in the [St. Lucy River](#) and Ohio in [Grand Lake St. Marys](#). India and the Netherlands are also interested. This year, Moeller has given a [lecture in Ft. Lauderdale, FL](#) to the National Algae Association and in Toledo, Ohio, for water treatment managers. Moeller's next goal is to scale up the technology to treat larger bodies of water, like Lake Erie. He is using several government and private funding sources. However, others involved with water treatment and harmful algal blooms are unsure of whether treating Lake Erie with NBOT is a good idea. "I'm skeptical because so many things have been tried and never worked, so I would like to see the data in operation on that scale first," said Pam Taylor, a full-time volunteer for the [Environmentally Concerned Citizens of South Central Michigan](#). "I'm all for anyone who can figure it out, but we need to ask how easy it can be applied to 10,000 square miles," said Frey, of Ottawa County Sanitary Engineering. Though, he acknowledges not all of Lake Erie may need to be treated. "Dumping tons of alum into the lake is going to be just as bad as the blooms themselves," said [Nathan Manning](#), research scientist for the National Center for Water Quality Research at Heidelberg University. "So, if they can figure out something that is nontoxic and environmentally neutral, that'd be great." "If it is effective at removing the nutrients, the fuel for cyanobacteria, then I think it could be scaled up and work," said [Heather Raymond](#), former Harmful Algal Bloom Coordinator for

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the Ohio Environmental Protection Agency (EPA) and current Water Quality Research Initiative director for Ohio State University. To her, the potential benefits of NBOT are clear, but more research is needed before testing Lake Erie. She also predicts the cost of using NBOT on Lake Erie will be as high as any other method. She estimates that one treatment could be millions of dollars, depending on factors, such as ozone dose, flow of water, and amount of water treated. Currently, Moeller is waiting for permission from the Ohio, Michigan, and Minnesota state department EPAs to begin working on Lake Erie. Although it may take multiple treatments, he is confident NBOT can solve the problem of harmful algal blooms. By placing larger NBOT machines on barges and moving up and down the lake as a tractor would in a field, he believes all of Lake Erie's water can be improved. "We're going to see cleaner water and we're going to see it at a large scale," Moeller said, "it will work."

ehn.org, 3 February 2020

<https://www.ehn.org>

Food packaging can harm human health

2020-03-03

Harmful chemicals in food packaging and other food contact materials can pose considerable risk to our health, according to a review of more than 1,200 peer-reviewed studies. The report's authors—33 scientists from around the globe—urged lawmakers to take swift action to reduce exposure. The problem, they said, is particularly acute for recycled materials and plastics alternatives promoted as more environmentally friendly in response to plastic pollution concerns. The consensus statement is based on more than 1,200 peer-reviewed studies, and the authors conclude that hazardous chemicals can transfer from food contact materials into food, and some are known endocrine disrupting chemicals, or "EDCs." EDCs are associated with chronic diseases such as diabetes, obesity, cancer and neurological disorders like ADHD.

"Virtually everyone who eats food is exposed to food contact chemicals, but some are known to be hazardous and many are untested or even completely unknown," said Jane Muncke, managing director of the Food Packaging Forum and a statement co-author. "Chemical migration from food contact articles like packaging must be systematically addressed, and any hazardous substances removed – and not just replaced with other, less well studied chemicals." The report, "Impacts of food contact chemicals on human health: a consensus statement," was published Monday in the journal Environmental Health. The authors of the

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consensus statement analyzed existing lists of food contact chemicals issued by legislators, industry and NGOs worldwide. They found almost 12,000 distinct chemicals potentially in use in the manufacture of food contact materials today. The authors say while there is a great amount of information for some of the most well-studied food contact chemicals, such as bisphenol A (BPA) and phthalates, many of the 12,000 reported food contact chemicals lack data on their hazardous properties or level of human exposure. This suggests that the human population is exposed to unknown and untested chemicals migrating from food wrappings, with unknown health implications.

ehn.org, 3 March 2020

<https://www.ehn.org>

How South Korea is composting its way to sustainability

2020-03-02

Trash is new. During the nineteenth century, New York was dirty but much of its garbage consisted of leftovers and scraps and other items to reuse. Sunday's roast became Monday's hash; Monday's bread became Wednesday's bread pudding. Pigs roamed the streets, eating old lettuce and radish tops. "Swill children" went from house to house, collecting food scraps that they sold to farmers as fertilizer and animal feed. Bones became glue. Old grease was turned into tallow candles, or mixed with ashes to make soap. Disposable packaging was almost nonexistent. In nearly every decade of the nineteenth century, the city's population doubled. New York began to dump its excess into the Atlantic Ocean. In 1895, George Waring, a former military officer, became sanitation commissioner. "Colonel Waring's broom . . . saved more lives than a squad of doctors," the social reformer and journalist Jacob Riis wrote, of the man who put sanitation workers in white suits. Waring made New York households and businesses separate out food waste and ashes; he diverted horse manure for use as fertilizer. Food waste was turned into soap, grease, or compost, or carted to pig farms in New Jersey. Some of the ash became cinder blocks. Some went for expanding the footprint of Rikers Island. Three years after his appointment, Waring died, of yellow fever. His sorting program continued until the First World War, when it was abandoned because of labor and material shortages. By 1918, the city was again dumping waste into the ocean. Or depositing it in landfills. The story of New York's garbage hasn't changed as much in the past century as you might imagine, given that we now have the technology to 3-D-print a baby Yoda, or to run a car on old vegetable oil. Paper and plastic are

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separated, but recycling of organics—food waste, yard waste, pretty much anything that rots—remains voluntary, even though such material makes up about a third of New York's trash. All but five per cent of the city's organic waste goes to landfills. Organic waste doesn't just stink when it's sent to landfills; it becomes a climate poison. Yes, we've been schooled again and again in the importance of recycling—by friends, by pious enemies, even by "WALL-E." But the recycling of organics is arguably more important than that of plastics, metal, or paper. Composting transforms raw organic waste into a humus-like substance that enriches soil and enhances carbon capture. In landfills, starved of oxygen, decomposing organics release methane, a greenhouse gas whose warming effects, in the long run, are fifty-six times those of CO₂. The United States has greater landfill emissions than any other country, the equivalent of thirty-seven million cars on the road each year. Last April, the New York State legislature enacted laws requiring large businesses and institutions to recycle their food waste, but New York City is exempt from the new rules. In 2013, when Michael Bloomberg was in his final year as mayor of New York, he instituted an organics-recycling program, which officials said could become mandatory in a few years. Bill de Blasio, who was the public advocate at the time, supported that vision, but as mayor he has failed to fund it. I live not far from Times Square, near a food-cart-storage facility, a family-run butcher shop, and a La Quinta hotel; one of the lower floors of my building houses a catering business. Since the sides of the street are reserved exclusively for cars, there's no room for dumpsters. Instead, each night a low wall of piled garbage bags appears, as if left by malign elves. Sometimes there are bags of kaiser rolls and tired fruit. A caramel-colored goo oozes onto the sidewalk. Walking by the trash embankment the other evening, I startled one of our neighborhood rats, which sped across the curb and down a sewer drain. All of which I find, to be honest, totally normal. I landed in Seoul, South Korea, on a hazy morning in early October, the day before Typhoon Mitag was expected to hit the southern coast of the Korean Peninsula. Today, South Korea recycles ninety-five per cent of its food waste, but twenty-five years ago almost nothing was recycled. In the nineteen-nineties, following the country's rapid industrialization and the movement of its people from rural areas to the cities, the trash dumps at the cities' edges overflowed. Poor families lived near the dumps; many of them picked through the garbage for plastics and metals to sell. Food scraps, an incidental petri dish for disease, made the dumps foul, sickening the garbage pickers. "We had people lying down in the road in front of the garbage trucks to prevent more being brought to the landfills," Kim Mi-Hwa, the head of the Korea Zero Waste Movement Network, told me. "The government saw that it had to do something." The K.Z.W.M.N.'s office is

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about the size of a California closet. It's on the twelfth floor of a modern office tower, the Gwanghwamun Platinum Building, down the street from shops that offer hourly rentals of *hanbok*, the bright-colored traditional garment worn for ceremonies. I arrived with Lucia Lee, my interpreter. We set our shoes among a small crowd of slippers near the door. Kim, a youthful fifty-seven-year-old woman dressed in a blue-and-white striped button-up, pulled folding wooden chairs out from under a small central table. A young woman brought the three of us ceramic mugs of buckwheat tea. The office had the efficiency of a ship's cabin. Kim's activism dates back to the nineteen-eighties, when she studied nutrition and food culture at university. She became involved in the pro-democracy student movements, and was a leader campaigning for equal rights for women. K.Z.W.M.N. was formed, in 1997, from a network of thirty-one grassroots organizations. "Our primary work is to advocate for change in government policies, for laws," Kim said. "We also have a lot of programs aimed at educating the public." K.Z.W.M.N. was instrumental in advancing Seoul's ban on plastic bags, which went into effect at the end of 2018. During Kim's childhood, the city that is now a landscape of high-rises and skyscrapers was largely farmland. "After the Korean War, food waste was not a problem—people were starving," she said. "We took our food scraps outside and fed them to the cows and pigs." In 1995, South Korea replaced its flat tax for waste disposal with a new system. Recycling materials were picked up free of charge, but for all other trash the city imposed a fee, which was calculated by measuring the size and number of bags. By 2006, it was illegal to send food waste to landfills and dumps; citizens were required to separate it out. The new waste policies were supported with grants to the then nascent recycling industry. These measures have led to a decrease in food waste, per person, of about three-quarters of a pound a day—the weight of a Big Mac and fries, or a couple of grapefruits. The country estimates the economic benefit of these policies to be, over the years, in the billions of dollars. Residents of Seoul can buy designated biodegradable bags for their food scraps, which are disposed of in automated bins, usually situated in an apartment building's parking area. The bins weigh and charge per kilogram of organic waste. At the Energy Zero House, a model apartment complex in Seoul, a slim woman wearing dark clothes demonstrated how the "smart" composting bin worked. The bin resembled an industrial washer-dryer with a cheerful teal top, and had instructions for use in both Korean and English. She waved a small card, which looked like my grocery-store points card, in front of a scanner. The lid opened in a slow, smooth, and slightly uncanny fashion. In went the waste. A weight registered in red L.E.D. Then the lid lowered, with similar robotic indifference. Nearby was a separate cannister for used cooking oil.

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A tidy latticed structure covered the area, like a bus stop. For a Seoul family, the cost of food-scrap recycling averages around six dollars a month. The thirteen thousand tons of food waste produced daily in South Korea now become one of three things: compost (thirty per cent), animal feed (sixty per cent), or biofuel (ten per cent). "People from other countries ask me very often, 'How did South Korea achieve this success?'" Kim said. Sometimes it is attributed to the fancy technology that weighs and tracks the compost, and to the R.F.I.D. chips used in some municipalities to insure that households pay in proportion to the amount of waste they produce. "That is important," she told me. "But also I say the government shouldn't act directly. There needs to be an intermediary between the government and the people. Groups like us. That can explain back and forth. People don't want to hear it straight from the government." Setting up waste-processing sites was difficult, in part because there were fears that such sites would become sources of stink or disease, like the landfills. "We went door to door to talk to residents. We would bring people in for a tour of the food-waste facility. We would educate people about how it was healthy. I've been shouted at a lot," Kim said, laughing. "But things change. People are used to it now. These days, we focus on offering seminars at local centers, or wherever people gather." She added, "We have the most difficulty in wealthy neighborhoods and neighborhoods with foreigners." My interpreter, Lucia Lee, was twenty-six years old, "but in Korean I'm twenty-seven," she said. She told me that the nine months of gestation are included in one's age. Before becoming an interpreter, Lucia had worked at a hospital reading pathology slides, a job she chose because her sister had died of cancer. She found the work discouraging: "You aren't really able to help people." She began to travel, for months at a time, which surprised her friends, because she had always been frugal, not even buying coffee when they met. Living abroad, she soon learned other languages, including English, and decided to go to school in order to work as an interpreter. "My parents come from a very conservative area outside of Seoul," she told me. "In my family they have a scholarship, but it's only for boys." By "my family," she meant an extended group of relations involving some two thousand people. She paid for her schooling herself. On our way to meet Lee Eun-Su, the founder of the Nowon Urban Farming Network, an organization that has a hundred and thirty members, Lucia told me that she had loved reading up on composting—she wanted to make sure that she would be familiar with any specialized vocabulary. Being environmentally conscious is "popular" among young people, she said. "When I visited Taiwan, I saw drinks being served with stainless-steel straws in a restaurant." The Taiwanese government had placed limitations on the use of plastic straws. "I thought the straws were 'cool,' so I purchased

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one when I got back to Korea.” She smiled. She said that Seoul is now also imposing limits on plastic straws. For her birthday, she bought gifts for her friends—reusable water bottles. At the end of our subway ride, she showed me where the tickets were recycled. Lee Eun-Su, a slim, cheerful, and energetic fifty-five-year-old, told me that he “wakes up thinking about urban farming and goes to sleep to dream about urban farming.” He is very much a city person. His parents moved to Seoul from the countryside when he was young. “It was the best decision they made in their lives,” he said. He comes from a family of four children. His father was too ill to work, and his mother made money selling things in the street. The Nowon district, where Lee lives, is a middle-class neighborhood known for its good schools. Lee used to work installing cable in apartment buildings. He found himself in basements and on roofs. “That was when I saw all this unused space,” he said. “A waste!” He moved into a small apartment with his family, and now makes a modest living as a landlord, so that he can devote himself to promoting urban farming throughout Seoul. “It’s like a university, and I get to be a professor,” he said. He tapped his chest and grinned. “I was the one who proposed growing mushrooms in the basements,” he added. Sunnier urban-farm spaces grow lettuces, cabbages, peppers, peas, and flowers. Many of the organics-recycling bins in Seoul have the capacity to transform waste into compost, which can then be distributed to urban farms, sometimes in the same apartment complex. In the past decade, the number of such farms in Seoul has increased from sixty-six to more than two thousand. In a concrete high-rise bordered by a covered highway, we headed into the basement by ducking beneath a staircase lined with pictures of four varieties of mushroom. Each fungus looked spookier than the next: the shiitake, the golden oyster, the deer horn, the lion’s mane. Gathered in the basement were members of the building’s Urban Farming Committee. They were mostly older women, faces brightened with lipstick. They led us around their projects, small rooms lit by bluish lights. Cylinders of gauze-wrapped compost sat on metal racks; from the cylinders emerged what looked like sepia alien hands: deer-horn mushrooms. The rooms were humid and cool, and smelled like loam. A delicate tubular watering system wove throughout the metal racks. The effect was part sci-fi, part night club. On a table in an adjacent space, a crowd of full-grown deer-horn mushrooms, potted and wrapped in cellophane, might have been cousins to Christmas poinsettias. We were each given a pot. It was the day before the Korean holiday known as Gaecheonjeol, or National Foundation Day. (The holiday commemorates the founding myth of the Korean people, which involves a bear and a tiger that both wanted to be human. Only the bear was patient enough.) One of the women explained that the mushrooms are often used

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to make a tea that is sometimes sweetened with dates. Later, Lee showed us the composting system he had set up in a building where he keeps a tiny, crowded office. He has a lot of uses for compost: he has transformed the entire roof area—and a platform above it, near the cable and the water system—into a garden, where he grows marigolds, squash, mint, a date tree, and more. Lee has also made a “green curtain,” a trellis of various climbing vines, above the building’s parking area. Under an eave, a large barrel had been set up on a rotating metal stand, like a Foosball figure on a pole; this makes it easy to turn the compost, to aerate it. Lee unscrewed the lid of the barrel, revealing a dark mixture inside that smelled slightly of cleaning product. In the course of weeks or months, billions of microorganisms feed on the carbon and nitrogen in the composting mixture. Dry and brown organic matter provides carbon; green matter provides nitrogen. As the microorganisms process the mixture, they need oxygen, which is usually generated by stirring. Not enough oxygen, and the compost will smell like rotten eggs; too much nitrogen, and the compost will smell like ammonia; a good ratio of elements, and the compost will simply smell like fresh earth. Lee deposited a small bucket of food scraps into the barrel, sprinkling wood chips (for more carbon) on top. He then poured in a brown liquid from an old detergent bottle—microorganisms. He restored the lid and rotated the barrel a few times. “That’s it,” he said. Then we went out for bubble tea. During a brief break, I called home. My six-year-old shouted into the phone, “So they’re good at composting—come home now! And bring Pokémon souvenirs!” In my next chat across the globe, my mom said that, when she was a kid, in Tel Aviv, composting was done the old-fashioned way: people went into the street with buckets, gathered horse dung, and spread it in their gardens. She said that we make simple things complicated these days. She said they had bedbugs when she was a kid, too, and it wasn’t a big deal; they just took care of it. Antonio Reynoso, the chair of the sanitation committee of the New York City Council, told me, “I got my start as an environmental-justice advocate, and even I thought of composting as, like, this nice niche thing you might do in a garden.” Reynoso is thirty-six. He grew up on the south side of Williamsburg, the son of immigrants from the Dominican Republic. Until recently, his neighborhood received forty per cent of the city’s trash. “Trash goes to predominantly black and brown neighborhoods,” he said. We were in his small office, near City Hall. On a wall hung three maps: of New York’s bike paths, Brooklyn Public Library branch locations, and District Thirty-four, which Reynoso represents. Reynoso was first exposed to trash activism in 1998, when Mayor Rudolph Giuliani tried to put two more incinerators in his neighborhood, after the closing of the Fresh Kills landfill, on Staten Island. Hispanic activists

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working in alliance with the Hasidic Jewish community helped quash the plan. In New York, a million tons of organic waste are deposited in landfills each year. “Yet trash is always on the back burner of climate activism,” Reynoso said, pointing out that trash wasn’t even part of the Green New Deal until July, 2019, when Representative Ilhan Omar added the Zero Waste Act. Mayor de Blasio campaigned on a program of “Zero Waste,” promising to reduce landfill dumping by ninety per cent by 2030, but, in a recent press conference, seven years later, he said both that this is “an urgent, urgent goal” and that “I think what has happened here is that, you know, we have to look at the whole thing from scratch and come back with a plan that will get us there by 2030.” In 2018, de Blasio neglected to fund expansion of the organics-recycling program. The 2020 budget proposed by his administration for the New York City Department of Sanitation’s waste-prevention, reuse, and recycling programs was nine per cent lower than it was for 2019. Reynoso is working to get mandatory organics recycling passed by the City Council before the end of the year. He believes that he has the support and the votes to get this done. “Some things should be worked out through public discourse, and some things are just a given,” he said. “Organics is one of those things. On environmental justice, you have to be willing to spend political capital.”

The city’s organics-recycling program has so far diverted only a tiny fraction of waste from landfills. Curbside pickup is available for three and a half million New Yorkers, but only a small number take advantage of it. The city’s sanitation commissioner, Kathryn Garcia, who grew up and lives in Park Slope, insists that there is enthusiasm for the program. “That some people will haul their food waste half a mile to a drop-off at the farmers’ market tells you something about their commitment,” she told me. I asked if she thought many people were aware of the connection between food waste and climate change. “Not really,” she said. “Not even in Park Slope”—a famously liberal neighborhood, which has had a coöperative organic grocery store since 1973. Mandatory organics recycling could save money. Sanitation trucks would have waste to pick up throughout the city, as opposed to gathering bits and pieces from participating households. (Organics collection currently averages between one and two tons per truck shift, a fraction of the capacity of ten to twelve tons.) There’s even a small amount of money to be made from selling compost, though for now much of it is given away in the interest of generating enthusiasm and awareness. And the amount of waste that New York sends to landfills—some of which are as far away as South Carolina, all of which are in poor areas—would be reduced. The D.S.N.Y. spent four hundred and twenty-two million dollars last year to send trash to landfills—about a third of its

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budget. Making organics recycling mandatory was estimated in a 2016 report by the Citizens Budget Commission, a fiscally conservative think tank, to cost somewhere between a hundred and seventy-seven million and two hundred and fifty-one million dollars a year. City Hall had no counter-estimate to offer, but those figures include the onetime costs of updating trucks. “Climate justice is not cheap,” Reynoso said. But, he added, “it is the right thing to do.” The city’s current contracts with composting and biogas facilities can handle a modest two hundred and fifty tons a day. However, Reynoso said, “we could pass mandatory organics recycling and make the goes-into-effect date be tomorrow.” New Yorkers would need to learn a bit, too. Councilman Reynoso’s district participates in the voluntary organics-recycling program, as does mine. About a third of New Yorkers can sign up to have their organic waste collected from their homes, in brown bins, but many people are unaware of the program. Even in participating districts, only about ten per cent of organic matter is diverted from landfills. I asked a middle-aged man listening to music if he knew what a brown bin nearby was for. “Bones?” One of Reynoso’s priorities is a Save-As-You-Throw program, similar to the one in Seoul. (Initially, it was called Pay-As-You-Throw.) The proposal, which Commissioner Garcia is supportive of, would make pickup of all recycling—including organics—free, while charging for regular trash, beyond a fixed limit, by the bag. A similar model has worked well in other American cities. San Francisco launched mandatory organics recycling in 2009, and now diverts eighty per cent of food waste; a comparable model in Seattle has led to about sixty per cent of total waste being recycled. New York’s housing stock is distinct from that of those cities—it’s arguably easier to enforce mandatory recycling for single-family homes and smaller buildings—but it isn’t that different from Seoul’s.

Fresh Kills, on Staten Island, used to house a landfill composed of more than two thousand acres; now it is a site for recycling, with a large section devoted to composting yard and food waste. On a January day, the scent of Christmas filled the air—it was the first day of grinding up the season’s trees, which, after the strings of lights were manually removed, would become compost. That compost would eventually be spread in the city’s parks, distributed through giveaways, and purchased by landscapers for fourteen dollars per cubic yard. “We process the trees differently, because the needles are so acidic; that’s why you never see anything growing at the base of a pine tree,” Mike LeBlanc told me. LeBlanc is a facilities manager for Denali Water Solutions, which runs the site. Organic waste was arranged in nine windrows—long, wide strips that resemble burial mounds—which are monitored for levels of carbon and nitrogen, and also

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for temperature. Microorganisms generate heat, which speeds the transformation from waste to the “black gold” of suitable compost. At about a hundred and sixty degrees, harmful bacteria and weed seeds are destroyed. “Right now, it’s a four-to-five-month process,” Scott Morrell, the operation manager, explained. Interspersed among the windrows were truck-size machines that looked like toys: a bright-orange Doppstadt Inventhor ground up trees, an emerald-green Komptech Multistar sorted waste by size, and a white-and-yellow SCARAB turned and aerated the windrows with its inner spokes. Pointing to a thin brick tower in the distance, LeBlanc said, “We use that smokestack off the Con Ed plant to see which way the wind is blowing, because we try not to turn the piles when it’s going to send the smell inland.” Even a perfectly maintained compost pile starts out as many buckets of organic waste. The only food waste handled at the Fresh Kills site comes from Staten Island itself—the borough, having been the city’s principal landfill for more than forty years, has had enough of taking waste from the rest of the city. Seagulls, starlings, and sparrows crowded the windrows, which are full of nourishment. “Let’s show you the Tiger,” LeBlanc said, turning away from the windrows and toward a huge white canopy, several stories high. Inside was the Tiger Depack—a royal-blue machine with a white tiger painted on the side. It’s the size of a dumpster, but louder and prettier, with a price tag of about a million dollars. Through a centrifuge, the machine separates waste from the bags that it comes in. The bags and food wrappers, which are less dense than the organics, are spun to the periphery of the internal processor, like lint in a dryer. The Tiger then homogenizes the organic material by dampening and grinding it into bits of mash, thereby hastening decomposition. The machine’s final output comes through one of two spouts. The nonorganics spout was blowing out mostly wispy bits of plastic. From the other spout came a slurry of what looked like dirty oatmeal. The machine soon jammed. An employee wearing yellow work pants hopped up onto the Tiger, opening a side door to reveal several compressed lumps of biodegradable school-lunch trays. “One reason we do a pilot program with the schools is because education is the most important part of this,” Morrell said. “We’re trying to get kids interested. New York City is eight and a half million people set in their ways.” He went on, “You and I grew up throwing things in a landfill. Then the five-cent deposit came out—for glass, for cans. It changed the mind-set.” The school board toured the facility and learned that scraping food off the trays before throwing them out—which seems polite—gums up the machines. It’s easier if the trays are damp with food. LeBlanc and Morrell were fond of the Tiger, almost as if it were a pet. “And it came with two Italians,” LeBlanc said. The Tiger is made by an Italian company, which sent workers over to

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install the machine. “We thought they’d be interested in great food, but they were, like, ‘We love the place with the girl with the red hair!’ It was Wendy’s.” Even with the boom in urban farming in Seoul, where half a million residents are involved, to some extent, more compost is being made than can be used. “We have piles like this,” Kim Mi-Hwa said, raising a hand to the height of her shoulder. She shook her head. “The food is too much.” Last summer, using food scraps for animal feed was paused. “African swine virus,” she said. “Until they understand what is causing the outbreak, that part is on hold.” Current proposals aim to either lower the price of compost being sold or to improve its quality—it tends to be too high in sodium—by mixing it with other fertilizers. The Ministry of Environment is also supporting the construction of more biogas production facilities, to process more waste. Kim stressed that the only profound solution would be to create less food waste altogether. “Too much *banchan*,” she said, referring to the meze-like dishes that are a signature of a Korean meal. “Too much.” Koreans generate, on average, two hundred and eighty-five pounds of food waste per person, per year. Americans—not known for their sparseness—average between two hundred and ten and two hundred and fifty pounds. It can be difficult to experience one’s own efforts at recycling as meaningful, but it’s easy and horrifying to picture being followed around by one’s own personal many-tonned monster of trash. Lucia and I had plans that evening to meet Ahn Sang Hyun, the proprietor of Mr. Ahn’s Makgeolli bistro, who was going to show us how his business handled its food scraps. We found the Michelin-rated restaurant on a noisy street known for its craft bars and barbecue. Ahn is thirty-seven and slim, and was dressed in dark clothing. “Restaurant culture in Korea is a short story,” he said, after showing us the small bucket of waste that had been set out for collection. “First, the Japanese invaded. Then there was the Korean War. Then a dictator. Then another dictator.” There were restaurants, but there was no restaurant culture. In 1986, Seoul hosted the Asian Games, and in 1988 it hosted the Summer Olympics. Restaurants popped up to serve foreigners, and then stuck around for the locals in a suddenly modern, expanding city. “The idea with Korean restaurants then was abundance—it was about demonstrating growth and economic achievement,” Ahn said. A traditional Korean restaurant today is expected to offer many dishes of *banchan* free. “Those *banchan* dishes are for show. Most of it goes to the garbage.” Earlier efforts to reduce food waste included such government campaigns as “No Left-Overs Day,” in the nineteen-nineties, but a real shift in food waste would mean changing the notion of what constitutes a great meal. Some restaurants describe the traditional Korean meal as a three-, five-, seven-, nine-, or twelve-*cheop* meal, referring to the number of *banchan*. Others

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counter that thinking of the Korean meal that way is a modern invention. A small group of restaurateurs, including Ahn, thought, “We’ll charge for *banchan*, but serve *banchan* of a quality that people will actually eat,” Ahn told me. “Well, customers were unhappy, and said restaurants were being greedy.” He laughed. “But in the past five years that sentiment has changed.” Over dinner, Lucia told me that she was planning a birthday party for her boyfriend and had been trying to decide what to serve. He was a member of the Jain religion, from India, which avoids harming all living creatures. There were many foods that he didn’t eat, including meat, seafood, and eggs. (Some Jains also don’t eat fermented foods, because too many microorganisms die in the fermentation process; some avoid foods grown underground, like potatoes.) “It’s very difficult for him to find foods here in Korea,” Lucia said. Her boyfriend, an engineer, had come to Korea for a job at Samsung. He was working on a special refrigerator that can sense what food is inside it, and suggest recipes. Lucia shook her head. She thought there were simpler ways to reduce food waste—making wasting uncool, or making *not* wasting cool. When the government decided to reduce the purchase of bottled water, tap water was “branded” by neighborhood; the tap water in Seoul is *arisu*, a word that has connotations of being refreshing, she explained. It’s also an ancient name for the Han River, which runs through the city. Delicious food arrived. Abalone. A plate of smoked pork, with greens. We looked at the dessert menu, but Lucia told me that she wasn’t eating chocolate. It was something she was doing with her boyfriend, because, as part of the religious festival called Paryushana, some Jains choose to give up a particular food for a year. This isn’t because the item is immoral or unhealthy. “It’s more like: you might give up cabbage,” she said. “So that for one year the cabbage could live without fear.” She smiled. It was raining outside. Typhoon Mitag had flooded the southern coast, but in Seoul it had dissipated into an ordinary rainstorm. There were no leftovers.

[newyorker.com](https://www.newyorker.com), 2 March 2020

<https://www.newyorker.com>

The Philadelphia Zoo is running a farm inside a converted shipping container

2020-03-04

If you’re a fan of homegrown arugula and mustard greens, you just may have the same taste as Tua, a 27-year-old Sumatran orangutan. Tua lives at the Philadelphia Zoo, the first zoo in the country with its own on-site vertical garden used to grow leafy greens for its animals.

The garden is located in a retrofitted shipping container in the Urban Green, the zoo’s open-air food marketplace.

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And she loves the produce they're feeding her. The garden is located in a retrofitted shipping container in the Urban Green, the zoo's open-air food marketplace. A mural, by Philly-based environmental artist and activist Eurhi Jones, transforms the front of the shipping container into a colorful collage of the animals who'll chow down on the vegetation. But the real beauty is inside, where stacked, tidy shelves hold rows of plants that are grown hydroponically, in nutrient-rich water instead of soil. LED lights, a substitute for sunlight, shine 18 hours a day. Farm operators use a mobile app to remotely control the container's light, temperature, and humidity levels. Kristen Lewis-Waldron, director of strategic initiatives at the zoo, said the vertical farm is far more sustainable than bringing in food from outside sources. It uses 70% to 90% less water than traditional farming, has no need for pesticides or herbicides, and cuts greenhouse gas emissions out of the equation, since no motor-powered transportation is necessary to get the food to the zoo. "It really kind of creates this farm-to-table [model] — in this case, shipping container-to-exhibit," she said of the project, which is in a pilot phase.

[inquirer.com](https://www.inquirer.com), 4 March 2020

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