

Bulletin Board

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

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ASIA PACIFIC

AICIS (New Scheme) 1st July 2020

2020-04-08

The Australian Industrial Chemicals Introduction Scheme (AICIS) will replace NICNAS on 1 July 2020 as the new national regulator of the importation and manufacture of industrial chemicals in Australia.

The ban on the use of new animal test data for ingredients solely used in cosmetics will also begin on 1 July 2020.

Check out our new videos on the AICIS Inventory, confidential business information and AICIS evaluations.

NICNAS, 8 April 2020

<https://www.nicnas.gov.au/New-scheme-1-July-2020>

2020 World Day for Safety and Health at Work and Workers' Memorial Day

2020-04-20

Tuesday 28 April is World Day for Safety and Health at Work and Workers' Memorial Day.

World Day for Safety and Health at Work and Workers' Memorial Day is a time to think about how our actions can prevent future work-related deaths, injuries and illnesses, and a day to remember those that have died from a work-related injury or illness.

By raising awareness of work health and safety and taking action we can help prevent further injuries and death.

The theme for 2020 is Stop the pandemic: Safety and health at work can save lives.

COVID-19 has brought with it a need for Australians to adapt to rapidly changing workplace practices.

Under the model work health and safety laws, employers have a duty of care for the health and safety of their workers and others in the workplace. This duty extends to managing the risk of exposure to COVID-19.

Workplaces can reduce the risk of exposure to COVID-19 by:

- ensuring good hygiene and cleanliness in the workplace

The ban on the use of new animal test data for ingredients solely used in cosmetics will also begin on 1 July 2020.

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- implementing physical distancing, and
- using personal protective equipment as appropriate.

Safe Work Australia has developed COVID-19 information for workplaces to help employers respond to COVID-19, including information for specific industries such as building and construction, retail and childcare.

The duty of employers under the model WHS laws apply to psychological health too. This is a stressful time for all Australians, and employers must do what they can to reduce the psychological risks to workers and others in the workplace. See our Mental Health and COVID-19 webpage for more information.

This year, we encourage everyone to raise awareness about health and safety in the workplace.

Safe Work Australia, 24 April 2020

<https://www.safeworkaustralia.gov.au/media-centre/2019-world-day-safety-and-health-work-and-workers-memorial-day>

China consults on official English translation of RoHS2 conformity assessment guidelines

2020-04-23

China's Electronics Standardization Institute (Cesi) is consulting until 18 May on an official English language translation of the guidelines to accompany the conformity assessment rules under RoHS2.

Cesi is a nonprofit institution that sits directly under the Ministry of Industry and Information Technology (MIIT), which is the ministry responsible for China RoHS2. The institute is authorised by the government to develop national and industry standards.

The guidelines contain information on:

- the risk assessment of hazardous substances in electrical and electronic products;
- how to prepare the supporting documents required for conformity assessment;
- product conformity evaluation;
- how to prepare a declaration of conformity for the use of hazardous substances; and
- how to maintain evaluation results.

To date, a small number of translations have been published, but it is not known which foreign languages other than English will be included in future.

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The guidelines known as the voluntary national standard GB/T 37876-2019 (conformity evaluation guidelines for hazardous substances in electrical and electronic products) aim, together with the conformity rules, to support the implementation of China RoHS2.

They were approved last year and implemented from 1 March this year. Companies have been required to prove compliance with regard to the products listed under China RoHS2 since 1 November 2019.

Official translations

This official English language translation follows a 2016 decision by the Standardization Administration of China (SAC), the body responsible for the management, supervision and overall coordination of standardisation work in China, to provide foreign language translations.

To date, a small number of translations have been published, but it is not known which foreign languages other than English will be included in future.

“The government has highlighted it will focus on mandatory national standards and standards that have an impact on market entry for products [such as this one],” said Weiwei Luo, attorney at US-based law firm, Beveridge & Diamond.

“We can expect to see more foreign language translations in the future since there is such a high demand from foreign industry,” she added.

The decisions on which standards will be translated are made by individual industry standards committees. The SAC acts as the coordinating body and is responsible for publishing the standards.

“It is likely that SAC will have a prioritised list of translations that are being or will be worked on. But I do not exclude the possibility they will put the list to industry and the public for comments,” said Ms Luo.

Chemical Watch, 23 April 2020

<https://chemicalwatch.com/109920/china-consults-on-official-english-translation-of-rohs2-conformity-assessment-guidelines#overlay-strip>

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AMERICA

Substances added to Schedule I and Schedule IV of the U.S. Controlled Substances Act

2020-04-21

The following substance has been added to Schedule I of the U.S. Controlled Substances Act:

1. Fentanyl-related substances

In addition, the following substance has been added to Schedule IV:

1. Lemborexant

Yordas Hive, 21 April 2020

<https://www.yordasgroup.com/hive/news/article/890>

EPA delays TSCA science advisory meeting for asbestos

2020-04-21

The US EPA has postponed the Science Advisory Committee on Chemicals (Sacc) peer review meeting on the draft risk evaluation for asbestos.

The virtual meeting was scheduled for 27-30 April, but the EPA has delayed the meeting "due to recent changes in the availability of [Sacc] members". The agency did not say when the meeting would be rescheduled.

Sacc advisory panels provide independent recommendations to the EPA on the scientific basis for the agency's risk assessments.

Back in March the Asbestos Disease Awareness Organization asked the EPA to postpone the meeting and said it is "delighted the EPA finally listened to the scientific and public health communities and rescheduled the virtual Sacc meeting due to the coronavirus pandemic", the group said.

The agency did not cite the Covid-19 pandemic in its statement announcing the delay. When reached for comment, an EPA spokesperson said the agency's statement "speaks for itself".

The EPA published its draft risk evaluation for asbestos in late March, focusing on "ongoing" uses of the heat-resistant silicate. In it, the agency provisionally identified a number of unreasonable risks to workers, occupational non-users, consumers and bystanders, including from the use of asbestos diaphragms in the chlor-alkali industry.

In addition, the following substance has been added to Schedule IV: Lemborexant

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A preparatory virtual meeting was held on 7 April. This was designed to help the advisory panel consider the scope and clarity of the draft evaluation in preparation for the peer review.

At that meeting, the American Chemistry Council (ACC) recommended revisions to questions related to the chlor-alkali industry. It asked if the approach for attributing values for sample results that are below the limit of detection were consistent with EPA Superfund guidance for asbestos risk assessment.

Comments on the draft risk evaluation are due by 2 June. The EPA said it did not anticipate a delay to this deadline. But it did say that all written comments received on time would be given to the Sacc for a rescheduled peer review meeting.

The EPA said it would issue another announcement once a new date for the Sacc is finalised.

Chemical Watch, 21 April 2020

<https://chemicalwatch.com/109220/epa-delays-tsca-science-advisory-meeting-for-asbestos#overlay-strip>

EUROPE

Potential endocrine disrupting properties of toys for babies and infants

2020-04-03

Plastic toys mouthed by children may be a source of exposure to endocrine active substances. The purpose of this study was to measure hormonal activity of substances leaching from toys and to identify potential endocrine disruptors causing that activity. For this purpose, migration experiments of toys were conducted in saliva simulants. The CALUX[®] assays were used to detect (anti-) estrogenic and (anti-) androgenic activity of 18 toys. Chemical trace analysis—namely, GC-MS and HPLC-MS—was used to identify which compounds may be responsible for endocrine activity in the sample migrates. Nine out of 18 tested toys showed significant estrogenic activity. For two samples, the detected estrogenic activity could be well explained by detecting the known endocrine active substance bisphenol A (BPA). For all identified substances, including BPA, a risk assessment for human health was performed by comparing the exposure dose, calculated based on the

Nine out of 18 tested toys showed significant estrogenic activity.

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determined substance concentration, to toxicological reference values. Using worst-case scenarios, the exposure to BPA by mouthing of the two estrogen active, BPA-containing toys could be above the temporary TDI that EFSA has calculated. This demonstrates that some toys could significantly contribute to the total exposure to BPA of babies and infants. For seven out of nine estrogen active samples, the source of the estrogen activity could not be explained by analysis for 41 known or suspected endocrine active substances in plastic, indicating that the estrogen activities were caused by currently unknown endocrine active substances, or by endocrine active substances that would currently not be suspected in toys.

Plos One, 3 April 2020

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0231171>

Parliament decides to postpone new requirements for medical devices

2020-04-17

To prevent shortages or delays in getting key medical devices on the market, Parliament decided to postpone the application of the Medical Devices Regulation.

Parliament adopted the Commission proposal on Friday, by urgent procedure with 693 votes to 1 and 2 abstentions, allowing the application of the Medical Devices Regulation to be postponed by one year until 26 May 2021.

Given the current pressure on national health authorities and manufacturers of medical devices, there is a fear that there could be shortages or delays in getting the medical devices needed to fight COVID-19, were they to follow the new rules of the Medical Devices Regulation from May this year.

The European Parliament is therefore supporting the proposal to postpone the application of this Regulation by one year to allow authorities and manufacturers alike to prioritise the fight against the coronavirus pandemic by continuing under current procedures.

Next steps

European legislation ensures that medical devices are safe to use and facilitates patients' access to devices on the European market.

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The proposal now also has to be approved by the member states and published in the Official Journal before it will enter into force. This is expected at the latest by 26 May.

Background

European legislation ensures that medical devices are safe to use and facilitates patients' access to devices on the European market.

In 2017, two new regulations on medical devices and in vitro diagnostic medical devices were adopted to improve patient safety and increase transparency on medical devices across the EU. The new regulation for medical devices was supposed to be fully applicable on 26 May 2020. The date of application of the In Vitro Diagnostics Medical Devices Regulation is not affected by the new proposal and becomes applicable from 26 May 2022, as planned.

European Parliament, 17 April 2020

<https://www.europarl.europa.eu/news/en/press-room/20200415IPR77113/parliament-decides-to-postpone-new-requirements-for-medical-devices>

Commission removes derogations from draft EU tattoo ink restriction regulation

2020-04-20

The European Commission has removed certain derogations from its draft Regulation amending Annex XVII to REACH to restrict hazardous chemicals in tattoo inks or permanent make-up.

The restriction would impose concentration limits for substances, including:

- carcinogenic, mutagenic or reprotoxic substances (CMRs);
- skin sensitisers or irritants;
- substances that are corrosive or damaging to the eyes; and
- metals and other substances regulated in cosmetic products.

However it granted derogations for certain pigments.

In response to NGO feedback in the public consultation on the proposals late last year, the Commission has now removed derogations for pigments green 7 and blue 15:3.

The European Commission has removed certain derogations from its draft Regulation amending Annex XVII to REACH to restrict hazardous chemicals in tattoo inks or permanent make-up.

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These, the European Environmental Bureau says, were “not properly justified and not supported by Rac [Echa’s Risk Assessment Committee]”. Instead of a derogation, the draft, which was published this month, allows a two-year transitional period for their use.

It also takes on board another recommendation from EEB:

- Support Rac’s proposal for a “dynamic link” between the cosmetics product regulation and their classification, labelling and packaging (CLP) to ensure consistency of protection levels.

Next steps

On 7 April the Commission notified the WTO of its draft regulation. The WTO notification provides interested parties with a 7 June deadline to provide comments.

The EU executive is expected to adopt the amended Regulation in the second half of the year. Once adopted it will enter into force 20 days following publication in the EU’s *Official Journal*.

The restriction will begin to apply one year after the date of entry into force.

Chemical Watch, 20 April 2020

<https://chemicalwatch.com/106546/commission-removes-derogations-from-draft-eu-tattoo-ink-restriction-regulation#overlay-strip>

INTERNATIONAL

IOFI updates Global Reference List

2020-04-17

On 17 April 2020, the International Organization of the Flavor Industry (IOFI) updated the Global Reference List (GRL). The following substances were added:

1. 1-(3,5,5,6,8,8-Hexamethyl-5,6,7,8-tetrahydronaphthalen-2-yl)ethanone
2. S-Allyl-L-cysteine sulfoxide
3. trans-5-Dodecenal
4. cis-6-Dodecenal
5. cis-9-Dodecenal

On 17 April 2020, the International Organization of the Flavor Industry (IOFI) updated the Global Reference List (GRL).

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6. Mixture of 5-hydroxy-4-(4'-hydroxy-3'-methoxyphenyl)-7-methylchroman-2-one and 7-hydroxy-4-(4'-hydroxy-3'-methoxyphenyl)-5-methylchroman-2-one
7. 2-Ethoxy-4-(hydroxymethyl)phenol
8. 2-Mercapto-3-methyl-1-butanol
9. Hexyl propyl disulfide
10. 3-Methyl-2(5H)-furanone
11. trans-Tetradec-4-enal
12. 2,6-Dimethylheptenyl formate
13. L-Carnitine tartrate
14. 3,7-Dimethyl-2-methyleneoct-6-en-1-ol
15. Tridec-5-enal
16. 4,7-Decadienal
17. 3-Methylbutane-1,3-dithiol
18. S-Methyl 5-(1-ethoxyethoxy)tetradecanethioate
19. S-Methyl 5-(1-ethoxyethoxy)decanethioate

The following substance was removed:

20. N-Ethyl-5-methyl-2-(methylethenyl)cyclohexane carboxamide

Yordas Hive, 17 April 2020

<https://www.yordasgroup.com/hive/news/article/891>

Supreme Court maintains Amazonas ban on cosmetic testing on animals following industry challenge

2020-04-15

The Brazilian Supreme Court decided today that the State of Amazonas was within its rights to promulgate Law 289/2015 banning cosmetic tests on animals in its territory. The law, passed in 2015 by the State Assembly of Amazonas to end these cruel and unnecessary tests, was challenged by the Brazilian Association of Cosmetics, Personal Hygiene and Perfume Industry (ABIHPEC). ABIHPEC submitted a Direct Action of Unconstitutionality (ADI 5996) to the Supreme Court in September 2018, arguing that the State of Amazonas had overstepped its powers and that the subject matter could only be ruled at the federal Level.

Humane Society International submitted an opinion to the Court, defending the constitutionality of Amazonas' ban by underlining that the state prohibition on the use of animals for cosmetic testing was both

In a unanimous vote, the 11 judges decided against ABIHPEC's request and confirmed that Amazonas has a legal right to ban cosmetics testing.

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legally valid and scientifically sound. In a unanimous vote, the 11 judges decided against ABIHPEC's request and confirmed that Amazonas has a legal right to ban cosmetics testing.

Helder Constantino, HSI/Brazil's #BeCrueltyFree campaign manager, congratulated the Supreme Court for its decision: "It is wonderful that some progress has been achieved for the animals in these difficult times. Cosmetic tests on animals are unethical and strongly rejected by consumers. Over the years, a total of eight states have stepped in and enacted progressive legislation banning these tests, starting with São Paulo in 2014. This case was a very important one: if the law of the Amazonas had been declared unconstitutional, similar legislation could have been abrogated in all over Brazil. We congratulate the Court for its balanced judgement and for reaching its decision via a virtual process in order to comply with the confinement measures that we all must follow to slow down the COVID-19 epidemic."

ABIHPEC is also challenging Law 7.814/2017, which prohibits animal testing on cosmetics and the sale of cosmetics that have been tested on animals in the State of Rio de Janeiro. Judge Gilmar Mendes is presiding over the case (ADI 5995) and has yet to issue a decision.

HSI's #BeCrueltyFree campaign is supporting federal legislation ending cosmetic tests on animals. A report proposed to the Senate's Commission of Economic Affairs (CAE) by Senator Alessandro Vieira, amending Bill 70/2014, would ban animal-tested cosmetics and ingredients and ban testing cosmetics on animals with immediate effect.

Facts:

Launched in 2012 by Humane Society International, #BeCrueltyFree is the largest campaign in history to end cosmetics animal testing and trade globally.

In Brazil, #BeCrueltyFree has received the support of Xuxa Meneghel, Fernanda Tavares, Ellen Jabour, Ray Neon, Rita Von Hunty, and many other influencers and celebrities. #BeCrueltyFree has also been joined by other NGOs, such as Latin American consumer awareness group Te Protejo.

The states of Amazonas, Mato Grosso do Sul, Minas Gerais, Pará, Paraná, Pernambuco, Rio de Janeiro and São Paulo have already banned cosmetic tests on animals. Together, these states host approximately 70% of Brazil's national cosmetic industry.

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Thirty-nine countries have already enacted measures aligned with the objectives of the campaign, including the European Union, Norway, India, New Zealand, South Korea, Taiwan, Guatemala and Australia. Similar legislation is under consideration in Brazil, Canada, Chile, Colombia, South Africa, Sri Lanka, the United States and elsewhere.

Tests on animals are still allowed by National Agency for Sanitary Surveillance (Anvisa) regulations to assess the toxicity of cosmetics. Although some tests have been recently abolished by the National Council for the Control of Animal Experiments, a body of the Ministry of Science and Technology, long-term toxicity tests that can use hundreds of animals to evaluate a single substance are still allowed.

Human Society International, 15 April 2020

<https://www.hsi.org/news-media/brazil-supreme-court-upholds-amazonas-cosmetic-testing-ban/>

2020-04-17

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REACH Update

MAY. 01, 2020

REACH Study Results have been updated

2020-04-17

REACH study results is a collection of non-confidential substance data that were submitted to ECHA under the REACH regulation. An updated version is available to download from this website.

The data contain results from studies that relate to physical-chemical properties, environmental fate and pathways, and ecotoxicology and toxicological information. Making this data downloadable is another step towards the goals of REACH - both in terms of improving the safe use of chemicals, for example through improved safety data sheets, and the development and use of alternative methods.

The data are derived from information also published on the [ECHA website](#). However, in REACH Study Results, only the results of studies are presented, and in a reduced form. On the ECHA website data may be viewed one substance at a time, but REACH Study Results allows data to be read in bulk by importing the data in to a local installation of IUCLID, and then using the [IUCLID 6 REST Public API](#), the [IUCLID Data Extractor](#) or, an [advanced IUCLID search tool](#). The results are made available to download in an archive that contains dossiers in IUCLID format (i6z) for approximately 23,000 substances. This way of delivering REACH Study Results allows users to import only the substances in which they are interested.

The use of the REACH Study Results is subject to dedicated terms and conditions that must be accepted before downloading the data. For example, the data may not be used for registration under the REACH Regulation.

IUCLID News, 17 April 2020

https://iuclid6.echa.europa.eu/view-article/-/journal_content/title/reach-study-results-have-been-updated?utm_source=echa-weekly&utm_medium=email&utm_campaign=weekly&utm_content=20200422&clde=Y2lhcmEudGhydXNoQGNNoZW1pY2Fsd2F0Y2guY29t&recipientid=lead-03dc9dd70a48ea118116005056b9310e-b330544c63f94841bf007ff424acb568&esid=be7302cd-7884-ea11-811e-005056b9310e

An updated version is available to download from this website.

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REACH Update

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Rac to discuss CLH in May

2020-04-23

Echa's Committee for Risk Assessment is holding an online meeting on 4 May to go through three proposals for harmonised classification and labelling (CLH).

These were set to be covered in the March meeting but it was cut short due to the impact of the coronavirus Covid-19 pandemic.

The remaining CLH proposals from the March meeting will be discussed at a meeting in the autumn.

The next full Rac meeting will be held virtually from 1-12 June. The agenda is available on Echa's website.

ECHA, 23 April 2020

https://echa.europa.eu/documents/10162/29022590/RAC-52B_Part1_ProvisionalDraftAgenda_4May20.pdf/23b1cc67-b150-e7da-b9ba-3f5cd940e2ab

Consultation update: proposed restriction of PFHxA

2020-04-23

Echa has clarified two questions related to the restriction proposal for undecafluorohexanoic acid PFHxA, its salts and related substances and also expanded the non-exhaustive list of substances in scope.

Further details can be found in the updated information note and indicative list of substances.

The agency ran an online information session on 23 April covering scope and how to contribute to the consultation.

Questions can be submitted until 29 April, and will be published as a Q&A document shortly afterwards.

Chemical Watch, 23 April 2020

<https://chemicalwatch.com/110256/echa-round-up#overlay-strip>

Echa has clarified two questions related to the restriction proposal for undecafluorohexanoic acid PFHxA, its salts and related substances and also expanded the non-exhaustive list of substances in scope.

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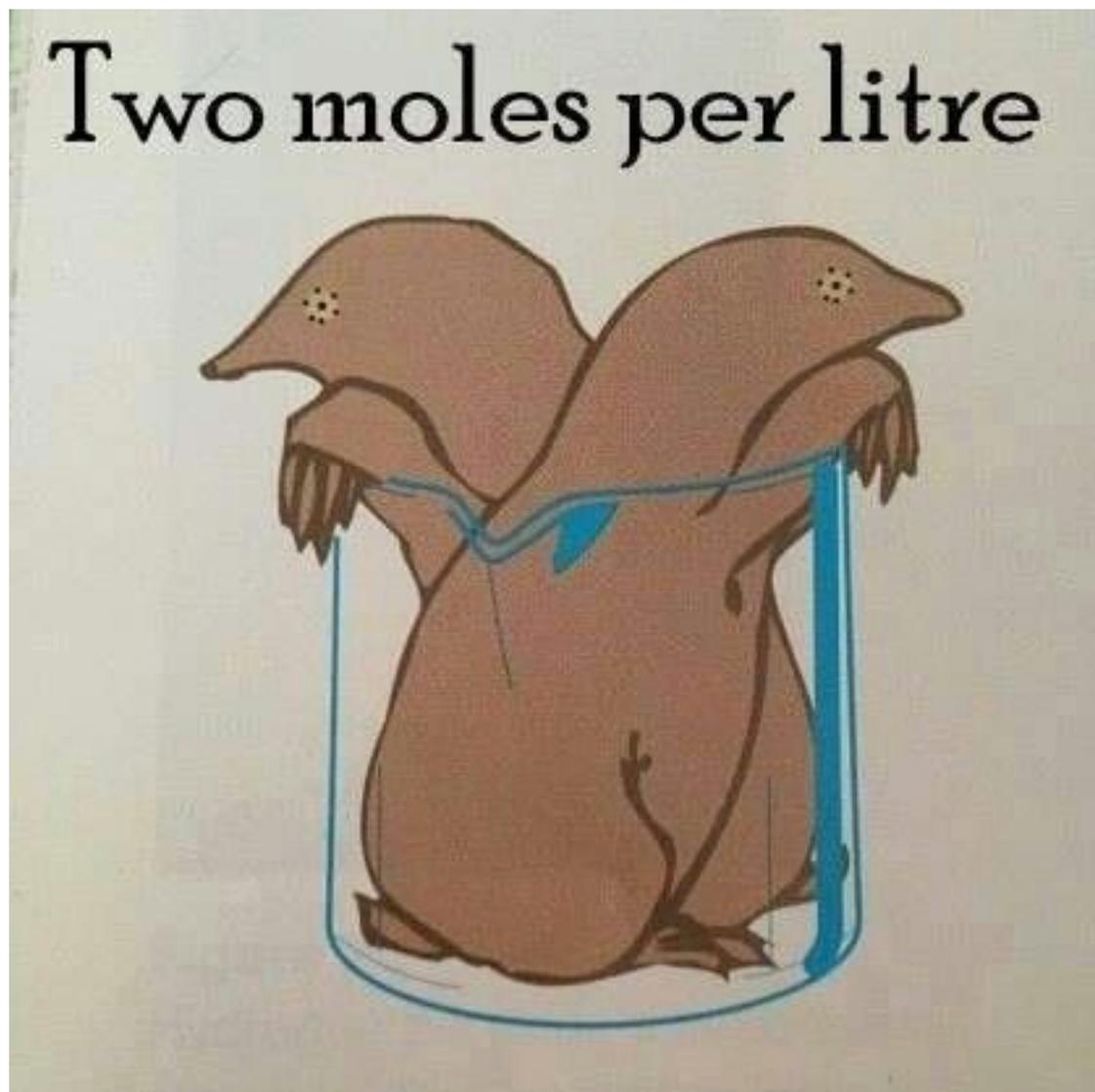
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Janet's Corner

MAY. 01, 2020

Two Moles Per Litre

2020-05-01



https://www.pinterest.com.au/pin/ASKvAHbSD7Guismccy_befpxRP1F9slwC1PO5gRbQ2acsG7pSVBMbvs/

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Hazard Alert

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Acetone

2020-04-07

Acetone—also known as propanone—is a colourless flammable liquid with a strong fruity odour. Acetone is the smallest and simplest ketone and its formula is $(\text{CH}_3)_2\text{CO}$. It is an organic compound and is produced directly or indirectly from propylene. Human beings produce and dispose of acetone naturally as a byproduct of metabolism. People with diabetes produce acetone in higher amounts. The compound is highly flammable, with a flash point of -18° . [1,2]

USES [1,2,3]

Acetone is used in a number of different ways, including as a solvent and in beauty products. As a solvent, the compound is incorporated into “blends” for lacquers. It is also used in paints and varnishes and is helpful when using metal for soldering. In cosmetics, acetone is commonly used in nail polish remover to break down the polish. It is widely used because of its ability to mix well with water (another common ingredient). The compound is also used to degum silk. It has also been used as an anticonvulsant in patients with epilepsy.

ROUTES OF EXPOSURE [4]

- Ingestion or absorption are the typical routes of exposure for acetone.
- As acetone is naturally produced as a byproduct of metabolism, it is typically eliminated within 24 hours of ingestion or absorption into the body.
- People can also be exposed to acetone through the burning of fuel, when the compound has been used as an additive.

HEALTH EFFECTS

Acetone poisoning affects a range of systems including the skin, nervous and respiratory systems.

Acute Effects [4,5]

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

- Low level exposure to acetone typically causes no effects.
- Higher levels of exposure could lead to runny nose, throat and skin irritation and nausea. It could also cause dizziness and irritability.

Acetone—also known as propanone—is a colourless flammable liquid with a strong fruity odour.

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- Rapid acetone exposure in an enclosed environment could lead to victims experiencing delirium and confusion.
- Other symptoms include: headache, shortness of breath, narcosis, vomiting and a cough. Prolonged skin contact may eat away at the skin.

Chronic Effects [4,5]

Acetone is toxic to multiple body systems. Long-term exposure to the compound can result in cracking skin, a skin rash and/or inflammation, which can lead to irritation. It can also cause a dry/sore throat and nausea. It has also been linked to a feeling of weakness, the loss of appetite, loss of weight and a possible inflammation of the respiratory tract. For those who inhale the compound regularly (through occupation), damage to their lungs could be a problem.

SAFETY

First Aid Measures [6]

- Ingestion: If only a small amount has been swallowed, give water to the victim to swallow and flush out the toxin. DO NOT induce vomiting. Contact a doctor or a poison centre. If larger amounts have been ingested, place the victim in the recovery position and immediately call a medical professional.
- Skin contact: In case of skin or hair contact, remove/take off all contaminated clothing and immediately wash exposed skin with water. Do not re-wear clothing until it has been decontaminated. Immediately call a doctor or poison centre.
- Eye contact: Flush eyes carefully with water for at least 15 minutes. Check for and remove contact lenses if easy to do so. Continue rinsing. Obtain medical attention if irritation occurs or if there is a loss of vision.
- Inhalation: Take contaminated person to the nearest fresh air source and monitor their breathing. Allow them to rest and contact a medical professional. If there are signs of drunkenness or respiratory irritation (i.e. a headache or dizziness), seek immediate medical attention.

Exposure Controls/Personal Protection [5]

- Engineering controls: Safety showers and emergency eyewash fountains should be accessible in the immediate area of the potential exposure. Ensure there is adequate ventilation. Use sealed systems when using the chemical.

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- Personal protection: Safety glasses, antistatic and flame retardant clothing, gloves, an apron and an appropriate mask.

REGULATION [7]

United States:

The Occupational Safety and Health Administration (OSHA) has set an 8-hour time-weighted average (TWA) concentration for acetone of 1000ppm. The recommended exposure limit (REL), set by the National Institute for Occupational Health and Safety (NIOSH) is 250ppm. The REL is a level at which workers would be safe if they were to use this chemical over the course of their lifetime.

Australia [6]

The National Occupational Health & Safety Commission (NOHSC) has set an 8-hour TWA for acetone of 500ppm. The Short-Term Exposure Limit (STEL)—usually set at 15 minutes—for acetone is 1000ppm. It should be noted that the TWA values are likely to be higher than the biological standards exposure level for the compound; therefore, all reasonable steps must be taken to minimise the level of exposure to a level well below the workplace standard.

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Discarded coronavirus face masks and gloves rising threat to ocean life, conservationists warn

2020-04-17

The rise in disposable face masks and gloves being used to prevent the spread of coronavirus is adding to the glut of plastic pollution threatening the health of oceans and marine life, environmentalists warn.

On Wednesday, New York Governor Andrew Cuomo issued an executive order, effective this weekend, that New Yorkers must now wear a mask when out in public in situations where social distancing isn't possible.

The CDC advises wearing cloth masks in public (although President Trump says it's not mandatory and he "doesn't see it for himself") due to the concern that Covid-19 can be spread by people who are infected but not showing symptoms.

Surgeon General Jerome Adams warned Americans to stop buying medical masks that are needed by healthcare workers.

It has done little to stop a wave of single-use masks and latex gloves being used and discarded.

On social media, pictures of bright blue gloves and crumpled masks littering streets, shopping carts, parking lots, beaches and green spaces are being posted around the world. It's left to sanitation workers and grocery store staff, those essential but underpaid frontline employees, to pick them up.

Those not picked up can be caught by a gust of wind or washed down drains, ending up in the ocean and waterways.

Not only is there a potential health risk of dropping used masks and gloves during the pandemic but many contain materials that do not recycle and are not biodegradable. Surgical masks are made using non-woven fabrics including plastics like polypropylene.

According to NOAA, plastic wreaks havoc on marine ecosystems. As plastic swirls around in the water, much of it breaks down to tiny pieces, called micro-plastics.

The Ocean Conservancy discovered that many fish species consume plastics debris, confusing it for real food and estimated that at least 600 different wildlife species are threatened by the pollution.

It has done little to stop a wave of single-use masks and latex gloves being used and discarded.

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There is also a human health risk from plastic entering the food chain with nearly a billion people around the world consuming seafood as their primary source of protein.

Used masks and gloves add to an already significant problem: At least 8m tons of plastic end up in the oceans every year, making up 80 per cent of all marine debris, according to the International Union for Conservation of Nature.

The bright colours of latex gloves can be mistaken as food by seabirds, turtles and other marine mammals putting them at risk of severe injuries and death.

Last year a sperm whale, which died after becoming stranded on a beach on the Isle of Harris in Scotland, was found to have 220lb of debris in its stomach including bundles of rope, plastic gloves, bags and cups.

An early warning sign of the worrying trend came in February, when conservation group OceansAsia posted a photo of dozens of surgical masks they discovered on Hong Kong beaches during a year-long research project into marine debris and micro-plastics.

Co-founder Gary Stokes told *The Independent*: "The way I see these masks in the environment is just another addition to the ever-growing marine debris crisis our oceans are facing. No better, no worse, just shouldn't be there in the first place. I'm waiting to hear of the first necropsy that finds masks inside a dead marine animal. It's not a question of if, but when."

Coronavirus masks are adding to Hong Kong's marine trash problem which flows from mainland China and elsewhere. "People think they're protecting themselves but it's not just about protecting yourselves, you need to protect everybody and by not throwing away the mask properly, it's very selfish," Tracey Read, founder of the group Plastic Free Seas in Hong Kong told Reuters.

In the US, Maria Algarra, was so concerned about the uptick in plastic waste that she started a hashtag campaign on 23 March called #TheGloveChallenge, asking people to send photos as a way to track littered gloves and raise awareness of the issue. (She made clear that people should not pick up the items unless they feel it's safe and they have personal protective equipment).

Ms Algarra founded Clean This Beach Up in Miami, Florida last year. Before the pandemic, the movement had grown to 1,600 people, from

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high school students to octogenarians, volunteering to pick up trash on beaches across Miami-Dade and Broward counties.

She told *The Independent* that since the coronavirus outbreak, she had seen dozens of plastic gloves floating in the bay, in parking lots and on the Venetian Causeway bridges linking Miami Beach to the mainland.

As part of the campaign, Ms Algarra has been sent 1,200 pictures of jettisoned plastic gloves – not only in Miami but in the boroughs of New York City and in Italy, Spain, Germany and New Zealand. A rough count adds up to more than 1,800 gloves in these pictures alone.

She has received a lot of photos from Portugal, France and New Jersey particularly. Of the latter, Ms Algarra said: "I couldn't believe my eyes. One girl sent a video where she found over 30 gloves from her car to the door of the store that she was going to."

Ms Algarra said that the gloves were a growing problem both for the ocean and on dry land. "It not only causes risk to wildlife but to other people who could get infected, our sanitation workers and other shoppers for example, when gloves are left in carts.

"With the glove challenge, it's about education. That's the key for us to do better as a community and as humans.

"We can't expect people to change their ways if they don't know what they're doing wrong."

She added: "Plastic breaks down into smaller and smaller pieces until micro-plastic is everywhere. It's toxic and it's in what we're eating and drinking.

"There's no way to clean up micro-plastics. Once trash makes it into the ocean and breaks into smaller pieces, it's almost impossible to take it back."

[independent.co.uk](https://www.independent.co.uk), 17 April 2020

<https://www.independent.co.uk>

Beer may lose its fizz as CO₂ supplies go flat during pandemic

2020-04-18

Dwindling supplies of carbon dioxide from ethanol plants are sparking concern about shortages of beer, soda and seltzer water - essentials for many quarantined Americans.

Gasoline demand is down by more than 30% in the United States.

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Brewers and soft-drink makers use carbon dioxide, or CO₂, for carbonation, which gives beer and soda fizz. Ethanol producers are a key provider of CO₂ to the food industry, as they capture that gas as a byproduct of ethanol production and sell it in large quantities.

But ethanol, which is blended into the nation's gasoline supply, has seen production fall sharply due to the drop in gasoline demand as a result of the COVID-19 pandemic. Gasoline demand is down by more than 30% in the United States.

The lack of ethanol output is disrupting this highly specialized corner of the food industry, as 34 of the 45 U.S. ethanol plants that sell CO₂ have idled or cut production, said Renewable Fuels Association Chief Executive Geoff Cooper.

CO₂ suppliers to beer brewers have increased prices by about 25% due to reduced supply, said Bob Pease, chief executive officer of the Brewers Association. The trade group represents small and independent U.S. craft brewers, who get about 45% of their CO₂ from ethanol producers.

"The problem is accelerating. Every day we're hearing from more of our members about this," said Pease, who expects some brewers to start cutting production in two to three weeks.

In an April 7 letter to Vice President Mike Pence, the Compressed Gas Association (CGA) said production of CO₂ had fallen about 20% and could be down by 50% by mid-April without relief, CGA CEO Rich Gottwald said in the letter. Meat producers are also feeling the pinch, as they use CO₂ in processing, packaging, preservation and shipment.

Orion Melehan, CEO of Santa Cruz, California-based LifeAID, a specialty beverage company, said two of his production partners are looking for alternative CO₂ sources.

"It does have us up at night figuring out what our options are," Melehan said. "It highlights the laws of unintended consequences."

A spokeswoman for National Beverage Corp, whose products include LaCroix, said the company sources from a number of national CO₂ suppliers and does not anticipate a supply issue.

Coca-Cola Co, SodaStream owner PepsiCo Inc, wine and beer seller Constellation Brands Inc and several bottling companies did not respond to requests for comment

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Walker Modic, environmental and social sustainability manager for Bell's Brewery, said the Comstock, Michigan-based brewing company had "not experienced any curtailments or changes in the source of our CO₂."

Denmark-based Carlsberg Group said that the company is "almost self-sufficient."

"We, in line with our sustainability program, create our own CO₂ and capture it during the brewing process," spokesman Kasper Elbjorn.

reuters.com, 18 April 2020

<https://www.reuters.com>

Controversial 'gene drive' could disarm deadly wheat pathogen

2020-04-17

The *Fusarium* fungus is the bane of every wheat farmer's existence. Causing wheat scab—also known as head blight—it decimates harvests and contaminates grains with a toxin harmful to people and animals. Now, Australian researchers have come up with a new strategy to combat *Fusarium graminearum*, the most notorious wheat scab pathogen. In the lab, they have used a genome-altering technology called "gene drive" to get rid of the fungal genes that make this pest so toxic.

The new wheat strategy would be the first use of a gene drive to control a pathogen in plants. The findings are "very enticing" for both plant and human health, says John Leslie, a fungal pathologist at Kansas State University. Yet gene drives have never been deployed outside of the lab and plans to use them to eliminate mosquitoes and other pests have been controversial.

Wheat scab is a growing problem in North America, Europe, and China. Researchers are scrambling to breed wheat resistant to this fungus, with **some recent success**. Even so, "Disease management is reaching a crossroads," says Peter Solomon, a molecular plant pathologist at the Australian National University.

It takes a lot of time and effort to develop new breeds of wheat. And producing significant resistance to this fungus will likely require introducing multiple genes. Even then, complete protection may not be achieved. Meanwhile, the fungus rapidly becomes resistant to any chemical treatments, and various countries are beginning to ban the use of these fungicides. For those reasons, Solomon says, "It's important that

In the lab, they have used a genome-altering technology called "gene drive" to get rid of the fungal genes that make this pest so toxic.

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we don't shy away from considering new and novel methods for managing diseases."

So Donald Gardiner, a molecular biologist at the Commonwealth Scientific and Industrial Research Organisation in St. Lucia, Australia, and his colleagues decided to see whether they could make *Fusarium* less potent by using **gene drive**. The process involves introducing DNA into an organism that causes one version of a gene to be passed on to the next generation but not another. Eventually, just the desired versions of those genes remain in the population.

Scientists typically use the gene editing tool CRISPR as the gene driver. That's how researchers **hope to fight malaria**: They adapted CRISPR to spread a gene that transformed populations of a malaria-transmitting mosquito into all males so the species cannot reproduce. Given the many uncertainties about the long-term consequences of releasing a gene drive, scientists are proceeding cautiously with such work.

Although aware of those concerns, Gardiner and his colleagues still felt a gene drive was worth exploring for wheat scab. Their intent was to get rid of three *Fusarium* genes that make the pathogen highly infectious and the infected grains toxic, all while leaving the fungus otherwise intact DNA-wise.

They found that CRISPR did not efficiently spread the innocuous versions of these genes. But a gene in another fungus—what Gardiner calls a natural gene drive—proved up to the task, being more efficient than CRISPR and easier to work with.

Gardiner and colleagues linked that gene to innocuous versions of the three targeted genes. Once in the *Fusarium*, the gene-drive gene caused any sexually produced spores that wound up with the original versions of targeted genes to die. Thus, the innocuous versions were preferentially transferred to the next generation. Those subsequent generations **were less able to cause wheat scab** but otherwise were no different from the typical *Fusarium*, the team reports in a preprint posted this month to bioRxiv.

"It's a bit like replacing a couple of sentences in the middle of a large book with some unrelated text," Gardiner says. In just three generations, the three virulent genes were completely gone, he and his colleagues report. "We think the technology should be applicable to many other economically important pathogens," Gardiner says.

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Others are skeptical. "It's a new idea, but not practical," says Caixia Gao, a plant biologist at the Chinese Academy of Sciences in Beijing. She doesn't think any *Fusarium* deprived of its virulence genes could survive in the wild and outcompete unaltered versions of the fungus or other *Fusarium* species. "The consequences will be that other pathogens may dominate," she says, and the disease would still be a problem.

And Leslie stresses that many fungi, including some types of *Fusarium*, rarely or never reproduce sexually, which is a prerequisite for a gene-drive control mechanism to work. Furthermore, "Developing field tests will be very important and probably difficult to design," he adds. The team will have to show the gene drive is effective in reducing wheat scab under natural conditions, Leslie says, and at the same time make sure that the modified fungus doesn't escape into the wild. Even if the logistical issues can be worked out, getting regulatory approval to release a genetically engineered plant pathogenic fungus will be hard.

Yet, "The concept is worth exploring" Leslie says. "Even if it fails, we should learn a great deal about how to manage fungal populations."

sciencemag.org, 17 April 2020

<https://www.sciencemag.org>

Scientists set new solar power efficiency record at almost 50 per cent

2020-04-14

Scientists at the National Renewable Energy Laboratory (NREL) in the US have set a new world record solar energy conversion efficiency, producing an innovative solar cell that converts light into electricity with almost 50 per cent efficiency.

The new solar efficiency world record was set by NREL researchers using a "six-junction" solar cell, that used 140 layers of semiconductor materials to achieve a conversion rate of 47.1 per cent.

The new solar cell design now holds the record for solar conversion efficiency for any type of solar photovoltaic design, breaking the previous record set by the Fraunhofer Institute for Solar Energy Systems ISE and Soitec of 46 per cent set back in 2014.

The researchers believe the new technique could provide a pathway for producing solar cells with even higher efficiencies that are ideally suited for use in concentrated solar power devices.

The scientists produced a six-junction solar cell, combining sandwiching multiple layers of materials that were fine-tuned to convert different portions of the light spectrum into electricity.

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“This device really demonstrates the extraordinary potential of multijunction solar cells,” lead researcher and a principal scientist in the High-Efficiency Crystalline Photovoltaics Group at NREL John Geisz said.

The scientists produced a six-junction solar cell, combining sandwiching multiple layers of materials that were fine-tuned to convert different portions of the light spectrum into electricity.

A single junction solar cell faces a fundamental conversion efficiency limit of around 30 per cent, known as the Shockley–Queisser limit, but the scientists were able to overcome this by layering multiple cells together.

While the layered solar cell design will almost certainly be cost prohibitive to produce at commercial scale compared to conventional silicon cells, it may find use in more niche applications.

Generally, the super high-efficiency solar cells are limited for use in spacecraft and satellites, where performance, space and weight are a premium.

However, the researchers highlight that cells with such high conversion efficiencies would be ideally used in concentrated solar plants.

Rather than building a full solar farm of panels, as is currently done with commercially available solar cells, the ability to use a smaller number of the super high efficiency cells when paired with cheaper mirrors that concentrate the highlight could be a viable way to produce cost-competitive solar power.

“One way to reduce cost is to reduce the required area,” co-author Ryan France said.

“You can do that by using a mirror to capture the light and focus the light down to a point. Then you can get away with a hundredth or even a thousandth of the material, compared to a flat-plate silicon cell.”

“You use a lot less semiconductor material by concentrating the light. An additional advantage is that the efficiency goes up as you concentrate the light.”

The researchers trialled their nearly 50 per cent efficient solar cells with concentrated sunlight, producing the equivalent of 143 suns of solar intensity.

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Using unconcentrated light, the six-junction solar cells were able to achieve a conversion efficiency of 39.2 per cent, which was also a new world record.

The researchers were optimistic that producing a solar cell with greater than 50 per cent efficiency would be achievable.

Geisz added that the main barrier to achieving the higher efficiencies was to reduce the impacts of resistive barriers within the solar cells that impede the flow of current.

The new solar cell design has been detailed in a paper published in the journal Nature Energy.

The research follows similar milestones achieved by Australian researchers.

Last month, researchers from the Australian National University revealed that they had set a new efficiency record for 'tandem' solar cells that paired a conventional silicon solar cell with a new generation perovskite solar cell.

The ANU design achieved a conversion efficiency of 27.7 per cent, and could soon find its way into commercially available products.

In February, researchers from the University of Queensland set a new record for 'quantum dot' solar cells, which have the potential for use in flexible materials, or 'solar skins' that could be integrated into electric vehicles.

reneweconomy.com.au, 14 April 2020

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

Experimental schizophrenia drug could reduce long-neglected symptoms

2020-04-15

For the first time in decades, researchers may have a new way to tweak brain signals to treat psychosis and other symptoms of schizophrenia. Results from a 245-person clinical trial hint that a compound called SEP-363856, which seems to act on neural receptors involved in dopamine signaling, might address a broader range of schizophrenia symptoms than currently available drugs do—and with fewer side effects.

"If these results are confirmed, this will be big, big news," says Jeffrey Lieberman, a psychiatrist at Columbia University. The drug's developer, Sunovion Pharmaceuticals Inc., identified it through an unusual screening

The biological basis of schizophrenia remains a puzzle, but researchers have linked patients' hallucinations and delusions to an excess of the chemical messenger dopamine.

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process not guided by the brain circuits and receptors already implicated in the disease, Lieberman says. "It was a big gamble on their part. This study suggests that it may pay off."

The biological basis of schizophrenia remains a puzzle, but researchers have linked patients' hallucinations and delusions to an excess of the chemical messenger dopamine. To inhibit dopamine signaling, existing antipsychotic drugs bind to a type of dopamine receptor on neurons called D2. These drugs help control abnormal perceptions and thoughts—the "positive" symptoms of schizophrenia. But they don't do much to address either cognitive impairments or the "negative" symptoms, including lack of motivation, dulled emotion, and social withdrawal. "Those negative symptoms are often the most devastating," says Diana Perkins, a psychiatrist at the University of North Carolina, Chapel Hill. "A person can become, at the most extreme, robotlike."

The first generation of antipsychotic drugs that emerged in the 1950s sometimes actually worsened these negative symptoms, Perkins says. And tamping down on dopamine signaling can lead to side effects including tremors and other involuntary movements. A second generation of D2-targeting drugs has reduced the risk of some of these side effects, but many cause weight gain and other metabolic problems.

Sunovion started its drug search wanting to avoid D2 receptors. "It was a bit of an antitarget approach," says Kenneth Koblan, the company's chief scientific officer. "If [a compound] worked through the D2 system, we didn't want to work on it." The researchers relied on a drug screening method, developed by PsychoGenics Inc., that used artificial intelligence to analyze the behavior of mice exposed to hundreds of candidate compounds. The researchers looked for a compound that mimicked the effects of D2-targeting drugs. One stage of the testing involved trying to reverse the effects of phencyclidine, better known as PCP, which causes hyperactivity and other schizophrenialike behaviors.

SEP-363856 rose to the top of the heap. This compound didn't touch D2 receptors, the researchers found, but it activated two other types of neural receptors—known as TAAR1 and 5-HT1A—that help regulate the synthesis and release of dopamine. The mechanisms of the drug aren't fully clear, but the researchers suspect they've hit on a new way to tweak dopamine signaling.

The clinical trial tested SEP-363856's effects in people who were still early in the course of schizophrenia—none had been hospitalized for acute psychotic symptoms more than twice. During a flare-up of

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these symptoms, the participants, who ranged from 18 to 40 years old, spent 4 weeks in the hospital taking either SEP-363856 or an identical-looking placebo pill once a day. Clinicians then evaluated a broad set of schizophrenia symptoms using a measure called the Positive and Negative Syndrome Scale (PANSS), which gives scores ranging from 30 to 210, with a higher score representing worse symptoms. On average, participants scored roughly 100 on entering the study; after 4 weeks, **the average score in the drug group had dropped by 17.2 points**, versus 9.7 in the placebo group, the researchers report today in *The New England Journal of Medicine*.

"This is great news," says Romina Mizrahi, a psychiatrist at the University of Toronto. The trial didn't directly compare SEP-363856 to other drugs, but she notes that the reduction in PANSS scores is similar to results from some trials of now-approved antipsychotic drugs.

The group taking SEP-363856 also had a larger drop than the placebo group on another scale, one meant to measure negative symptoms like lack of pleasure and motivation. Though the study wasn't statistically designed to draw conclusions using this secondary measure, this early indication "is a big deal, and it's potentially a game changer," Perkins says. "If it's confirmed ... that would mean a lot for many patients and their families."

Rates of side effects, including movement disorders, nausea, agitation, and drowsiness, were low in both groups. And although SEP-363856's long-term effects on metabolism aren't clear, the compound didn't cause major weight gain in either the 4-week trial or a 26-week extension that included 156 of the participants, all of whom got the experimental drug.

Sunovion isn't the only company looking to sidestep D2 receptors in treating schizophrenia. Karuna Therapeutics is studying xanomeline, a compound with a different neural target, which Eli Lilly developed in the 1990s and later abandoned after finding that many patients experienced side effects that include nausea and dizziness. (Karuna aims to reduce those effects by combining xanomeline with another drug.) The company **announced positive results** from a study involving 182 patients last year.

In September 2019, Sunovion launched a larger, phase III trial that will include more than 1000 people, designed to prove the drug's efficacy and win regulatory approval. Koblan says he can't estimate when the

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trial might yield results, citing COVID-19. "I would be very comfortable answering that question if we weren't in the midst of a pandemic," he says.

sciencemag.org, 15 April 2020

<https://www.sciencemag.org>

Pandemic robs field scientists of 'once-in-a-lifetime' moments

2020-04-15

When Jane Goodall witnessed a chimpanzee troop split into two bands in 1974, she called the event a "once-in-a-lifetime" opportunity. Now, a group of chimp researchers fears missing its own once-in-a-lifetime moment because of the coronavirus pandemic. Two years ago, they, too, witnessed a chimp group fission at Kibale National Park in Uganda. The consequences surprised them: Males of one group recently attacked the other and beat up the females. "I would have never predicted that males that have grown up together would be at each other's throats," says John Mitani, a primatologist at the University of Michigan, Ann Arbor. But he and his colleagues are likely to remain ignorant about how this power struggle plays out over the coming months or even the next year.

Because of the coronavirus pandemic, most of the research team has left the country. Mitani says such precautions make sense for both humans and chimps, who are likely vulnerable to COVID-19, too, according to an 11 April **preprint** on bioRxiv. But he and his colleagues may miss the rare events that structure chimpanzee society.

From the tropics to the poles, field researchers are abandoning study sites because of travel restrictions and fears of catching or spreading the new coronavirus. Project leaders are making hard decisions about canceling field projects and are scrambling to help students stay productive. Fleets of research vessels have been grounded and crews quarantined. As a result, researchers are steeling themselves for potentially devastating gaps in long-term data sets on the world's flora, fauna, climate, and chemistry. Even automated surveys are in peril, as many expensive instruments need human tenders. "There's never been another time in history where we've seen an essentially global cessation of surveys and data collection about species and ecosystems," says Ben Halpern, an ecologist at the National Center for Ecological Analysis and Synthesis at the University of California, Santa Barbara.

Now, a group of chimp researchers fears missing its own once-in-a-lifetime moment because of the coronavirus pandemic.

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This year's data gap is coming just as the pandemic itself offers observers a once-in-a-lifetime moment. With business and travel almost at a standstill, pollution and other human impacts have diminished across the globe, offering a rare chance to see how the world works with a fainter human footprint. "It's like sending a spacecraft to Saturn for a flyby survey of the planet, only to have all the instrumentation stop working right when the spacecraft flies by," Halpern says.

Last month, Peter Marra, a conservation biologist at Georgetown University, conducted an informal Twitter survey of field scientists. Only 8.5% of the 450 responders, mostly ecologists, were going ahead with their planned fieldwork. One-third had canceled their field seasons. Even the North American Breeding Bird Survey, a massive, 54-year-old citizen science project that keeps tabs on birds across the Northern Hemisphere, was put on hold. Researchers fear losing track of reproduction and population trends in animals they've followed for decades.

Russell Hopcroft, a biological oceanographer at the University of Alaska, Fairbanks, remains optimistic. As he has done for decades, he was supposed to set sail this month to catch the annual plankton bloom in the Gulf of Alaska and collect data from automated instruments that tracked water conditions leading up to the bloom. Plankton, at the base of the marine food web, offer a bellwether for the productivity of this important fishing ground, which can vary dramatically year to year. "It sets the stage for how we expect the whole year to play out," Hopcroft says. The North Pacific Fishery Management Council depends on these and other data to set catch quotas for the season.

State and federal agencies have sidelined the research vessels that collect the data. Yet Hopcroft is scheming to get special permission for a much-reduced cruise before mid-May. His ship's crew is in quarantine after arriving from Washington, a COVID-19 hot spot, and Hopcroft and two volunteers will isolate themselves starting this week to be sure they are not infected. They want to be ready to hop on board should Alaska's 30-day clampdown loosen on 1 May. "We aren't ready to throw in the towel," he says.

Oceanographer Fiammetta Straneo of the Scripps Institution of Oceanography is less hopeful about her planned cruise in June for the Overturning in the Subpolar North Atlantic Program, which has deployed underwater instruments to continuously track temperature, salinity, and current velocity at various depths across the North Atlantic Ocean for 4 years. The goal of this joint U.S.-European effort, planned to run

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for 10 years, is to understand how ocean circulation is changing, which in turn will affect how climate change plays out. The instruments take data automatically, but if Straneo doesn't update them, they'll likely stop recording after this summer. "Having a 1-year gap will be a major loss," she says.

This year is also a missed opportunity for one of ecology's biggest data projects, **the National Ecological Observatory Network (NEON)**. Decades in the making, NEON aims to **monitor environmental changes** in a range of North American ecosystems, and 2019–20 was to be the first full year when it could gather standardized physical, chemical, environmental, and biological data from all its 81 U.S. sites. Some sites are new, but others have been operational for almost 10 years.

But on 23 March, NEON ceased all inperson and onsite work, such as trapping mammals and insects and sampling soil and water. Automated instruments collect much of NEON's data. But Paula Mabee, NEON's scientific director, says she was surprised by how many automated instruments need human tenders for calibration or to manage hazardous chemicals. Of the 73 data products on autopilot, "we proactively shut down" 24, including measurements of carbon dioxide and rainfall, she says.

The missing data will have short- and long-term implications, says Michael Dietze, an ecologist at Boston University. For example, data on tick and mammal populations are key to his team's annual predictions about when and how many nymphs of the deer tick that transmits Lyme disease will emerge.

One of the biggest blows is the grounding of NEON's airplanes. They are outfitted with cameras and remote sensing equipment to keep tabs on such variables such as the heights of trees and the chlorophyll and nitrogen content of plants, which are important for calculating carbon uptake. Philip Townsend, an ecologist at the University of Wisconsin, Madison, has been working to turn those measurements into easy-to-use maps. He'd planned to groundtruth his efforts by collecting leaves this season. But this spring, there will be both airborne measurements and leaf collection are on hold.

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Yet as disappointed as he and others are, delaying or shutting down such operations “is clearly the right decision,” Townsend says. “You want people to be safe.”

sciencemag.org, 15 April 2020

<https://www.sciencemag.org>

Coronavirus risks a return of the throwaway culture

2020-04-14

Europe’s ambition to be less wasteful just ran into a coronavirus crisis reality check.

One month after the European Commission launched an ambitious package to move from a throwaway culture to a more circular economy, the pandemic is creating mountains of plastic litter and tons of rotting food.

Irish garbage collectors observed a “record surge” in household waste — with a noticeable rise in unopened, past-sell-by-date food, as well as wilted garden greenery. Cities across the bloc have stopped recycling pickups due to staff shortages and fears of contaminated waste, with a lot of recyclables now being burned or landfilled.

In Belgium, Germany and the Netherlands, farmers have had to destroy millions of tons of unsold potatoes because people can’t eat fries in restaurants and bars.

The crisis has also brought about a resurgence of single-use plastics. In supermarkets across the Continent, buns, apples and avocados are smothered in plastic wrap — and people worried about catching a deadly disease don’t care.

“People are now more focusing on the hygienic and long-life aspects when it comes to foods and vegetables,” Mara Hancker, managing director of the German lobby for plastic packaging, said over the phone, adding that “people don’t have faith anymore in these products without the packaging.”

While garbage grows, the packaging industry sees an opening. The European lobby group for plastic manufacturers wants the European Commission and member countries to delay upcoming regulations and to lift all bans on some single-use plastic items.

Irish garbage collectors observed a “record surge” in household waste — with a noticeable rise in unopened, past-sell-by-date food, as well as wilted garden greenery.

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“During the last one or two years, the discussion has been very much driven by gut feelings and not by facts — we have very strong initiatives to go to plastics-free or packaging-free ... but are saying that there are good reasons to have plastics,” Hancker said.

A report from research firm BloombergNEF found that, in the short term at least, concerns “around food hygiene due to COVID-19 could increase plastic packaging intensity, undoing some of the early progress made by companies.”

NGOs are crying foul.

“The plastic bag industry has lost a lot of ground and is now running around [saying] that single-use plastics are more hygienic than reusable bags, and I have to say that is a claim that is not evidence-based and feeds on people’s anxieties,” said Jane Muncke, managing director of the NGO Food Packaging Forum, at a webinar earlier this week.

While the industry touts the benefits of disposable plastics, the environmentally friendlier alternative of reusable cups and bags is now seen as a disease threat.

Some European retailers have banned customers from using their own containers for food in order to avoid contamination risks. Coffee chain Starbucks won’t allow people to use reusable cups — only serving drinks in disposable single-use cups. In the U.S., some states banned reusable bags after misleading articles warned that reusable tote bags are worse than plastic ones for spreading coronavirus.

Yet EU and national food safety agencies say there is no evidence of food or food packaging being associated with transmission of COVID-19. A lot of that worry comes from a study by the U.S. National Institutes of Health, which found that the virus can survive up to three days on some surfaces, but scientists say those fears are overblown.

Karsten Nöckler, the head of the biological safety department at Germany’s Federal Institute for Risk Assessment, told POLITICO last month that “if you’re making such studies, you have to use a relatively high amount of the virus to measure effect at the end ... this proof does not comply with realistic conditions.”

The coronavirus is also not helping the EU to achieve one of its most important goals in the upcoming Farm to Fork strategy — halving food waste across the bloc by 2030.

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In the last month, a lot of edible food has been thrown away due to supply chain problems, the closure of restaurants, bars and hotels, as well as changes in consumer demand during the lockdown.

“The whole chain struggles to minimize waste ... but it is a challenge,” said Pekka Pesonen, the secretary-general of Copa Cogeca, a trade association of European farmers.

Worried Europeans have increased their spending on packaged foods with long shelf lives — a lot of which isn't getting eaten.

“Consumers seem to have gone to more non-perishable products, such as flour, pasta, canned food, UHT milk and cream, eggs, yeast and minced meat. All this will potentially create a risk for food waste in other parts of the value chain and different product categories,” Pesonen said.

It's an even bigger problem for the makers of perishable foodstuffs, such as milk, fruit and vegetables and grains, according to Pesonen.

Agriculture ministries and farming associations across the bloc are warning that the situation is especially dire in the dairy sector. Because milk prices are down, some dairy farmers are dumping unsellable milk.

That's prompting governments to introduce schemes to redistribute food that would otherwise rot.

In the U.K., the government is giving English food-redistribution organizations £3.25 million to help cut food waste and resell up to 14,000 tons of surplus stock; it is also spending €6 million on raw milk and €14 million on Pecorino cheese to resell to families in need.

Some EU agriculture ministers, including those from France, Germany and Poland, want the Commission to allow them to use emergency market measures, such as temporary permits to buy certain products from the market (so-called public intervention) or subsidizing storage to minimize food waste.

The problem isn't just mountains of uneaten food. The pandemic is also leaving crops rotting in fields.

Before the crisis, farmers relied on cross-border seasonal workers, often from Eastern Europe, to help harvest crops. But closed borders and travel

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restrictions mean asparagus, cucumbers and strawberries on many European fields are likely to go to waste.

politico.com, 14 April 2020

<https://www.politico.com>

This is the brightest supernova ever seen

2020-04-13

You're looking at an artist's conception of the brightest supernova ever recorded, a celestial explosion so massive it has blotted out the light of its surrounding galaxy, 4 billion light-years away. First discovered at Hawaii's Panoramic Survey Telescope and Rapid Response System observatory in 2016, scientists have spent the past several years studying the event, dubbed SN2016aps. It is perhaps the **largest supernova ever seen**, a catastrophic explosion that marks the end of a star's life, CNN reports. The colossal SN2016aps likely formed when two smaller stars merged ahead of what astrophysicists refer to as a "pulsational pair-instability" supernova—a previously theoretical type of supernova that ignites **pulsating waves of gas**, researchers report today in Nature Astronomy. The team hopes the finding will prompt NASA's new James Webb Space Telescope to look back in time to the deaths of the very first stars in the universe.

sciencemag.org, 13 April 2020

<https://www.sciencemag.org>

New class action launched over toxic firefighting chemicals used by defence

2020-04-16

Lawyers have launched a new class action on behalf of tens of thousands of residents over the defence department's use of toxic firefighting chemicals.

The case will allege defence's use of per-and polyfluoroalkyl substances (Pfas) had "cataclysmic consequences" for residents in Wodonga, Darwin, Townsville, Wagga Wagga, Edinburgh and Bullsbrook.

The highly persistent and probable carcinogens were used for decades in firefighting foam on defence bases, leaching into nearby land and water supplies, contaminating food and accumulating in humans.

It is perhaps the largest supernova ever seen, a catastrophic explosion that marks the end of a star's life, CNN reports.

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Residents near two other military bases – in Oakey, Queensland and Katherine, Northern Territory – reached a \$212.5m settlement with the federal government over Pfas contamination in February.

Residents in Williamtown, near Newcastle, were also reportedly awarded \$86m through the \$212.5m settlement.

The latest action, filed by Shine Lawyers, aims to compensate 40,000 residents for reductions in property prices caused by Pfas. Shine Lawyers' special counsel Joshua Aylward said the Pfas exposure was caused by government negligence.

"In some instances, property owners have seen the value of their land decrease by more than 50%," he said.

Pfas contamination has occurred right across the country, affecting dozens of towns and regions near defence bases, some fire stations, industrial sites and airports.

The handling of Pfas exposed serious failings in Australia's regulatory regime. Authorities were aware of the potential risks of Pfas 30 years ago, documents suggest, but were slow to phase them out and failed to warn residents.

Documents show the US Environmental Protection Agency warned the Australian government about Pfas and its "severe, long-term consequences" to human health and the environment in 2000.

"It appears to combine persistence, bioaccumulation and toxicity properties to an extraordinary degree," the US EPA wrote on 16 May 2000.

Defence only began a slow phase-out of its most toxic foam, 3M Lightwater, four years later.

Other internal documents suggest defence knew much earlier of the potential risks. Internal records from as early as 1991 suggest it knew firefighting and fire training at the Oakey base had "the potential to cause contamination of the environment".

Following the February settlement, the defence minister, Linda Reynolds, said it was an "important milestone on what has been a difficult journey".

"Defence sees itself as part of the fabric of these communities," Reynolds said. "Reaching a settlement is not the end of defence's engagement in these communities."

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The new class action will be lodged in the federal court, with Bullsbrook resident Reannan Haswell as its lead applicant.

Shine said the case was an open class action, meaning residents were automatically involved unless they elect to opt out.

The use of Pfas first prompted a class action in the United States in 2001, when American attorney Rob Bilott led a class action against DuPont, a chemical company, on behalf of 70,000 residents in West Virginia and Ohio.

The settlement of \$70m was used to fund a vast study of the human impacts of Pfas, which collected data from 69,000 people exposed over seven years.

The study found a probable link with high cholesterol, ulcerative colitis, thyroid disease, testicular cancer, kidney cancer and pregnancy-induced hypertension.

[theguardian.com](https://www.theguardian.com), 16 April 2020

<https://www.theguardian.com>

Why are men more likely to get worse symptoms and die from covid-19?

2020-04-16

We know that older people are more vulnerable to covid-19, but another major risk factor has emerged: being male.

The first signs of a sex difference in covid-19 severity emerged from hospital records in Wuhan shortly after the city locked down. On 30 January, a team at Shanghai Jiaotong University School of Medicine published a report on 99 covid-19 patients who were admitted to Jinyintan Wuhan hospital between 1 January and 20 January. They found that among those admitted, men outnumbered women by more than two to one.

There has also been a sex difference among deaths. Mortality data from 21 hospitals in Wuhan between 21 and 30 January, for example, revealed that 75 per cent of those who died were men.

Since then, larger studies from other countries have backed up these earlier findings. In England, Wales and Northern Ireland, for example, around 70 per cent of critically ill patients admitted to intensive care have been male, and a higher proportion of men than women have died.

They found that among those admitted, men outnumbered women by more than two to one.

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A study of more than 4000 covid-19 patients in New York City hospitals found that 62 per cent were male.

The difference doesn't appear to be caused by differential rates of infection: the New York study, for example, found that equal numbers of men and women catch the virus. But men are more likely to progress to severe illness and death.

Smoking and ACE2

Two previous emerging coronavirus diseases, SARS and MERS, have also been found to disproportionately affect men. But this isn't the case with respiratory infections generally. The report on England, Wales and Northern Ireland also looked at sex data on patients critically ill with viral pneumonia between 2017 and 2019, mostly due to influenza. There was an excess of men in this cohort too, but the ratio was less stark: 54 deaths for every 46 female deaths.

One possible reason for the sex difference is smoking. In China, over half of men smoke but only 5 per cent of women do. Tobacco smoke appears to cause lung cells to produce more of a surface protein called ACE2, which the virus exploits to infect cells. This may mean that smoking makes cells more susceptible to the virus.

However, according to an analysis by Hua Linda Cai at the University of California, Los Angeles, this hypothesis isn't supported by the data. Current smokers only make up about 12.5 per cent of people severely ill with covid-19 in China, she says, which is much lower than the proportion of smokers in the general population.

Another possibility is that men – older men in particular – are in generally worse health than women. They tend to have higher rates of obesity, high blood pressure, diabetes, cancer and lung and cardiovascular disease, all of which have been linked to covid-19 severity. When the authors of the New York study factored these conditions into their analysis, they found that sex was no longer one of the main risk factors for severe covid-19.

Immune differences

A possibly related idea is that women may naturally have stronger immune defences. "There are substantial differences in the immune system between males and females and these have significant impact on outcome from a wide range of infectious diseases," says immunologist Philip Goulder at the University of Oxford.

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One key difference is that women have two X chromosomes per cell whereas men have one. "A number of critical immune genes are located on the X chromosome," says Goulder, in particular the gene for a protein called TLR7, which detects single-stranded RNA viruses like the coronavirus. "As a result, this protein is expressed at twice the dose on many immune cells in females compared to males, and the immune response to coronavirus is therefore amplified in females," he says.

While one X chromosome is usually inactivated in each female cell, the *TLR7* gene somehow escapes this in some immune cells, meaning women produce more of the protein.

There is also some evidence that female sex hormones such as oestrogen and progesterone boost the immune system, but this hasn't been specifically investigated in covid-19 yet.

Another possibility is that men are simply less hygienic. They are less likely to comply with basic sanitation measures such as hand washing, says Kunihiro Matsushita of Johns Hopkins University.

A study of sex differences in China found that men with covid-19 in hospital were also more likely to be carrying other viruses, including flu, and bacteria, and it is possible that this may increase the severity of covid-19 symptoms.

[newscientist.com](https://www.newscientist.com), 16 April 2020

<https://www.newscientist.com>

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Male lemurs made spread fruity 'love potions' with their tails

2020-04-16

Ring-tailed lemurs have a peculiar habit of shaking their tails at potential rivals. New research shows that during the breeding season, a male's trembling tail may instead be whisking sexy odors toward potential mates. The work is still preliminary, but chemical analyses have revealed the odor is a mixture of three chemicals that seem to pique a female's interest.

The new work "calls attention to the often underappreciated fact" that odors play an important role in primate societies, says Peter Kappeler, a primatologist at the University of Göttingen.

Insects often use behavior-altering odors called pheromones to attract mates. So do mice. But biochemist Kazushige Touhara at the University of Tokyo wanted to know whether primates—including humans—use them as well. Some **researchers say yes**, but the existence of such "sex attractants" **remains controversial**.

Ring-tailed lemurs (*Lemur catta*), named for their fluffy gray and black tails, are unusual among their fellow primates. Males have glands on their wrists that produce chemicals that quickly vaporize when exposed to air—similar to pheromones. They rub their wrists on their tails to transfer the odors before they vaporize, then shake their tails to broadcast the scent.

For most of the year, these lemurs make bitter, leathery smelling chemicals used to keep other males at bay. But during the breeding season, they instead emit a sweet scent, Touhara says. He and his colleagues collected these secretions from the wrist glands with a tiny pipette and analyzed the chemical components.

Three **appear important for getting the female's attention**, he and his colleagues report today in *Current Biology*. All three are aldehydes, which are responsible for lots of odors. The three include one known to be an insect sex pheromone and another that smells like a pear.

Females spend time sniffing or licking the places droplets from these odors settle, but only during the breeding season, and only when all three chemicals are present, the team found. This suggests the identified odors may aid courtship during the breeding season, Touhara says. Moreover, the more testosterone a male had, the stronger the sweet smell, he and his colleagues note.

New research shows that during the breeding season, a male's trembling tail may instead be whisking sexy odors toward potential mates.

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Most pheromones are single chemicals, says Charles Snowdon, an emeritus psychologist at the University of Wisconsin, Madison, who was not involved with the work. "But what this paper is saying is that it's a mixture of chemicals that seem to be more important," he says.

However, Snowdon and Kappeler caution that the study involved very few animals—most of the data come from a single male—and thus the connection to mating is tenuous. Also, female lemurs tend to be quite promiscuous, so it's not clear that a male needs a sex pheromone to court them. "Sniffing and other olfactory behaviors by females should not be interpreted as expressing a preference" for one male over the other, Kappeler says.

Snowdon also worries many people are too eager to believe in so-called love potions, and may jump to conclusions not only about the existence of sex pheromones in lemurs, but also in people.

[sciencemag.org](https://www.sciencemag.org), 16 April 2020

<https://www.sciencemag.org>

Can masturbation boost your immune system?

2020-04-17

Have you spent all of lockdown playing with yourself? Masturbation can be a very useful outlet for relieving stress and anxiety, which many of us are feeling right now, and who doesn't love having an orgasm – or five – a day. If you're considering celebrating National Horny Day with yet another wank (and really, we've all got the time right now) are many benefits to it beyond an orgasm. Firstly, masturbation is a great way to tune out the current madness of the world and just enjoy your body. As mentioned, it reduces stress and makes us feel good by flooding your brain with happy hormones like dopamine and oxytocin – though the latter is specifically released when you climax. The dopamine can also help get rid of headaches or migraines. And, if you're having crazy coronavirus dreams, it could improve your sleep. Speaking of the deadly COVID-19 virus, could masturbation have an additional beneficial factor, and help you boost your immune system? Let's find out. Can masturbation boost your immune system? It's a complicated question, because there hasn't been enough research done in this area to give a definite answer. A small study from 2004 compared the white blood cell count (whose primary job is to stave off infections in the body) of male participants, pre- and post-orgasm via masturbation, and it showed that this count was higher after climax. The researchers, who also found that the masturbation

The dopamine can also help get rid of headaches or migraines.

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orgasm boosted adrenaline and prolactin plasma concentrations, which is a protein hormone that has multiple functions, one of which is to be used by other immune-boosting cells. However, as we said, it was a very small study, of just 11 participants. 'There is evidence to support that components of our immune system are activated by sexual arousal and orgasm,' Dr Sarah Welsh, a gynaecologist and co-founder of the Hanx, a sexual wellness brand, tells us. 'Orgasms, whether through sexual intercourse or masturbation, causes an increase in the levels of adrenaline and other immune cells within the bloodstream, indicating the positive impact sexual arousal can have on the immune system.' Additionally, research has found that masturbation lowers the risk of type 2 diabetes, could reduce the risk of prostate cancer and reduces blood pressure. Dr Lucy Glancey, who runs a clinic in London, explains that masturbation could be beneficial to the immune system on four levels; physically, psychologically, with the aforementioned stress reduction, biologically and immunologically. 'Psychologically, by producing a positive experience it creates a sense of well-being and therefore strengthens the individual's mind to deal with stress, which in turn helps to combat illness.' 'Chemically by increasing the endorphins dopamine and catecholamines, which in turn can help in the "fight and flight" phase of stress on the immune system.' 'Biologically by increasing the levels of hormone called oxytocin which counteracts the negative effects of cortisol on the immune system.' 'On an immunological level, sexual arousal and orgasm it increases the circulating lymphocytes which are 'the soldiers' of our immune system.'

MORE: HEALTH Man with Down's syndrome hugs mum after beating coronavirus What will Ramadan under lockdown look like? Woman who lost all her limbs at 18 becomes a brilliant makeup artist However, let's clarify one important thing: masturbating will not cure coronavirus. And while some studies suggests that bringing yourself to orgasm could boost the immune system, more research needs to be done in the area to give a definite answer. Then again, we're talking about orgasms and masturbation, so it can't hurt to give it a go. Though do bare in mind that masturbation isn't just about climax, so if you can't get there, don't force yourself. But, to help you along, we have put together a guide of seven different types of male orgasms and one for women on how to have a better orgasm.

[metro.co.uk](https://www.metro.co.uk), 17 April 2020

<https://www.metro.co.uk>

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Aspirin linked with significantly lower risk of developing multiple cancers

2020-04-18

The simple, inexpensive blood thinner and pain reliever aspirin has been associated with a significant reduction in the risks of several types of cancers, according to a newly published study. The potential benefits were linked to cancers of the digestive tract, including ones that are often deadly like pancreatic cancer. The findings were based on more than 100 observational studies.

Acetylsalicylic acid, more commonly called aspirin, is an inexpensive drug that is typically used to treat pain, thin blood, and reduce fevers. The medication is available over the counter and through prescriptions and may, in some cases, be taken daily in low doses for various health reasons. Because of the drug's blood-thinning effect, it shouldn't be taken regularly or in high doses without consulting a doctor first.

The latest study, which was recently published in the *Annals of Oncology*, found that across 156,000 cases, the regular use of aspirin — meaning one to two tablets taken weekly — was linked to reductions in digestive cancers, but not with head and neck cancers.

The reduction, in cases where it was present, was significant, including a 38-percent decrease in hepato-biliary cancers, a 39-percent decrease in gastric cardia, 27-percent decrease in bowel cancer, and 22-percent decrease in pancreatic cancer. Looking specifically at bowel cancer, the researchers found that higher doses of aspirin were linked with a greater reduction in cancer risk.

This doesn't mean that someone should start taking aspirin regularly, however, nor that they should start taking high doses of the drug. Study lead Dr. Cristina Bosetti, Ph.D., explained:

... the estimate for high dose aspirin was based on just a few studies and should be interpreted cautiously. Our findings on bowel cancer support the concept that higher aspirin doses are associated with a larger reduction in risk of the disease. However, the choice of dose should also take into consideration the potential risk of stomach bleeds, which increases with higher aspirin doses.

Another researcher on the study, Professor Carlo La Vecchia, also noted:

Taking aspirin for the prevention of bowel cancer, or any other cancers, should only be done in consultation with a doctor, who can take account of the person's individual risk. This includes factors such as sex, age, a family history

The potential benefits were linked to cancers of the digestive tract, including ones that are often deadly like pancreatic cancer.

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of a first-degree relative with the disease, and other risk factors. People who are at high risk of the disease are most likely to gain the greatest benefits from aspirin.

slashgear.com, 18 April 2020

<https://www.slashgear.com>

What one of the world's most active volcanoes tells us about missing trees

2020-04-13

Giant tortoises and flying foxes once roamed La Réunion, a volcanic island off the eastern coast of Africa. Then humans arrived and decided to stay. Within 150 years of their appearance, large fruit-eating animals like the giant tortoises (*Cylindraspis indica*) and flying foxes (*Pteropus niger*), a type of bat, were wiped off the face of La Réunion.

This speck of land in the western Indian Ocean, an overseas department of France, was one of the last corners of the planet to be colonized by humans. It is also home to the Piton de la Fournaise, one of the most active volcanoes in the world. It was recently in the throes of another eruption, having erupted almost 240 times since 1650.

The scars from these eruptions are now helping scientists uncover the lasting effects of permanent human settlement on life on the island, including the loss of large-fruited trees like *Sideroxylon borbonicum*, known locally as *bois de fer de Bourbon*, and *Labourdonnaisia calophylloides*, or *bois de natte à petites feuilles*.

The fates of flora and fauna are linked. Animals and birds are important to plants; they help to disperse seeds, transporting them near and far. Which seeds and how far they get scattered depend on the kind of creatures that get their paws or beaks on the seeds. The largest fruit eater inhabiting the island today is the Réunion bulbul (*Hypsipetes borbonicus*), a bird a thousand times smaller than the now extinct giant tortoise. The bulbul can't feed on fruits that the tortoise could eat.

Not many would consider living in the shadow of an active volcano good fortune. For Sébastien Albert and his colleagues at the University of La Réunion, however, the frequency of eruptions at Piton de la Fournaise has proven providential. They recently published a paper in the *Journal of Ecology* describing the loss of large-fruited trees by creating a timeline over several centuries. Because the time of each eruption is known, it

Then humans arrived and decided to stay.

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is possible to see how the plant community changed before and after human colonization.

Albert described the island as a “paradise” before humans established themselves there around the mid-17th century. The forests were dotted with towering trees that bore large, fleshy fruits enclosing chunky seeds. Seeds come in all sizes; the biggest in the world is the genitalia-shaped seed of the coco de mer (*Lodoicea maldivica*) found on Seychelles, an archipelago north of La Réunion. It can grow 30 centimeters (1 foot) across and weigh more than 15 kilograms (33 pounds). At the other end of the spectrum, some orchids produce seeds that are a fraction of a millimeter across, finer than a grain of sand.

The Réunion bulbul can only consume seeds smaller than 13 mm, or about half an inch. A larger species of bird native to La Réunion, the Mascarene parrot (*Mascarinus mascarin*), went extinct before the turn of the 19th century. So did the Réunion fruit pigeon (*Nesoenas duboisi*).

Throughout the Mascarenes — the Indian Ocean islands of Mauritius, Rodrigues (which is today part of Mauritius), and La Réunion — this is a familiar tale. The extinction of the dodo (*Raphus cucullatus*) in Mauritius is emblematic of creatures lost to human exploitation.

Overhunting, habitat loss and invasive predators contributed to the animals’ disappearance. Giant tortoises were hunted by European sailors for their meat even before human habitation began. Their eggs fell prey to invasive species like pigs, cats and rats. Henri du Quesne, a French naval officer, wrote of the tortoises: “Their Flesh is very delicate; the Fat better than Butter or the best Oil, for all sorts of Sawces.” Another account from 1671 noted that it was not possible to go six steps without coming upon one of these friendly giants. By 1800, they were all but gone.

The difficult part is linking their disappearance to impacts on tree diversity. “There is evidence for declines in large-seeded species that rely on large vertebrates for the dispersal of their seeds. Examples include Africa, Peru, and Brazil,” said Elizabeth Wandrag, a plant ecologist at the University of New England, Australia, who was not involved in the study.

“It is not always possible to explicitly link the loss of large frugivores, and wholesale losses of species — many tree species that rely on large frugivores for dispersal are still present in forests that have lost those dispersers but have instead become more aggregated and/or show lower survival,” Wandrag told Mongabay in an email.

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Which is where the lava flows come in. Lava flow from a volcanic eruption is a major disturbance for any ecosystem; it tears through forests, burning everything in its path. It presents a kind of clean slate (literally) to see how plants recolonize. For existing forests, entangling the effects and even pinpointing the collapse of a species may not be as simple.

By studying how plant communities recovered after each eruption, the researchers realized that large-seeded species were not fully recovering because the fauna around them had changed since the previous eruption. "We analyzed 151 vegetation surveys on lava flows dated between 1401 AD and 1956 AD," the authors write in the paper. Tracking the changing vegetation over five centuries "has helped to pinpoint the important role that these lost animals played for these forests." The scientists say this is because when the animals that were best suited to disperse their seeds disappeared, the trees also started to fade away from the landscape.

"It was nice that the findings of this study mirrored some of those we have seen in our research on Guam without frugivores, some tree species simply aren't colonizing newly disturbed locations," Wandrag said. "In this case, the much longer history of defaunation, long-term chronosequence of plant communities, and botanical records allowed the authors to link that pattern to the resulting adult tree community."

[news.mongabay.com](https://www.news.mongabay.com), 13 April 2020

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

The pandemic could be an opportunity to remake cities

2020-04-13

LAST TUESDAY, A Gemballa Mirage GT barrelled into a series of parked cars on a Manhattan street. The driver fled and was arrested. And for a moment, New York seemed almost normal, free of the quiet that has ruled the city for three weeks, since residents were ordered to shelter in place to corral the spread of the novel coronavirus. As traffic has evaporated, car crashes in the city have dropped more than 50 percent compared with the same time last year. So have injuries to drivers, passengers, pedestrians, and cyclists. The air is cleaner, the honking but an echo.

Cities that have seen traffic calmed, however, face a new kind of congestion—not on their streets but their sidewalks. Like urbanites around the world, New Yorkers barred from offices, bars, theaters, and restaurants are crowding into the city's public spaces, often trampling social distancing rules in the process. Mayor Bill de Blasio said police will

As traffic has evaporated, car crashes in the city have dropped more than 50 percent compared with the same time last year.

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begin fining people up to \$500 for disobeying the order to stay 6 feet from others, a price that has since doubled. “Anyone who’s not social distancing at this point actually is putting other people in danger,” the mayor said on *The Today Show*.

De Blasio and many other civic leaders are trying to enforce the 6-foot line by restricting access to places where people get together: dog parks, basketball courts, playgrounds, beaches, hiking trails, and the like. The problem with curtailing the supply of open space, though, is that it doesn’t reduce demand. People still need to go outside, some to work, others to play, all to keep their sanity intact. Now, though, the demand comes chiefly from people on foot, rather than in vehicles.

In that shift, urbanists see a chance to save city dwellers not just from the sweep of a pandemic, but from the auto-centric culture that has dominated urban life for decades. They want to prioritize the movement of people—pedestrians, cyclists, transit users, and their ilk—over cars. This isn’t just opportunism, a shot at grabbing street space while most cars are parked. A range of tactics long demanded by urbanists can make life outside more pleasant and practical amidst the Covid-19 pandemic. And depending on how much life goes back to “normal” once the pandemic has passed, the moves could change cities for the better, and for the long term.

One easy, obvious option is disabling the buttons that pedestrians use to summon a “Walk” sign to cross the street. Advocates of pedestrian-friendly roads have long lambasted these “beg buttons” for making driving the default mode of transportation: no push, no walk signal. Now, public health officials see the devices as potential conveyors of the coronavirus. Several cities in Australia and New Zealand have rejiggered traffic signal cycles to include walk signals, no push needed. So has Berkeley, California. “That’s a good example of an easy and sustainable thing cities can do,” says Tabitha Combs, who studies transportation planning and policy at the University of North Carolina at Chapel Hill. By turning them off, cities are tacitly admitting that the buttons aren’t meant to make intersections safer for pedestrians, but to keep cars moving as much as possible. “They’ve let the cat out of the bag that it’s something they can do,” Combs says.

The bigger move is closing streets to vehicles, so people have more room to walk around or exercise. Bogota, Colombia; Calgary, Canada; Denver, Colorado; St Paul, Minnesota; Cologne, Germany and other cities have blocked off stretches of road in recent weeks. Friday, Oakland said it will close 10 percent of its street network—74 miles worth—to vehicle traffic.

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Others, like Vancouver, have booted cars from roads in parks. Closing streets, though, demands resources, including materials to indicate cars are no longer welcome and people to enforce the new regime.

New York tried its own street closures, but its program cordoned off just a few blocks and lasted only 11 days. In a [muddled explanation](#) for why he axed the effort, de Blasio cited a lack of manpower. “We did end up using up a lot of NYPD personnel that we don’t have to spare right now,” the mayor said in a press conference last week. In Toronto, transportation officials [rejected calls](#) to close a stretch of Yonge Street to vehicles, arguing that it would encourage people to gather, rather than spread out. But that argument may be flawed. “Shutting things down because they’re becoming too crowded seems pretty self-defeating to me,” Combs says. “Restricting the supply won’t have a concomitant effect on demand.” To help people get outside and stay safe, she says, cities should make more space for them, not less.

Cities that fear overcrowding should create many pedestrian-focused zones, argues urban planning consultant Brent Toderian, so all residents have one nearby. Those traffic-free streets should be “very ordinary, non-sexy,” [he advised on Twitter](#). “The opposite of a destination or a scene, because you don’t want to gather large crowds and you don’t want people traveling long distances to get there.” Toderian also advises making those reallocated streets into a network “that can be used for transportation and mobility” by health care workers and others who need to leave home for more than a bit of air.

Mobility is key here, especially in cities where many employees of essential businesses—[hospitals](#), [grocery stores](#), [delivery services](#), and the like—[don’t have cars](#). “The actions cities are taking that are purely to give people room to roam, not necessarily room to get anywhere, I think they’re useful,” says Combs, who also created a [public spreadsheet](#) cataloging such local actions. “But I don’t think they’re enough and I don’t think they’re equitable.” Many public transit agencies have cut service [to protect their workers](#), making their systems less useful for riders. In some cases, the few buses or trains they do operate [become too crowded](#) for riders to keep their distance. Making it easier and safer to travel by foot or bike—standard urbanist fare—could alleviate that stress.

Some cities have worked to do that, chiefly with more cycling infrastructure. Bogota brought out cones to add 72 miles of bike lanes to its already-robust network. Berlin fast-tracked the creation of a new wave of bike lanes. [Budapest is installing temporary bike lanes](#) on major

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thoroughfares and encouraging people who must leave home, whether to work or to shop, to pedal instead of drive. The Hungarian capital may make some of the upgrades permanent, depending on how things go.

Like so many other changes wrought by the pandemic, it's hard to predict the endurance of these efforts. "We're really early in understanding how cities are responding," Combs says. "And I think there are a lot of lessons to learn from a resilience and disruption standpoint." And even after the imminent threat to human health has been beaten back, those lessons could help keep our cities liveable.

wired.com, 13 April 2020

<https://www.wired.com>

When coal plants decrease pollution or shut down, people have fewer asthma attacks

2020-04-15

Asthma attacks decreased significantly among residents near coal-fired power plants after the plants shut down or upgraded their emission controls, according to a new study.

Coal-fired power plants emit air pollution that includes mercury, sulfur dioxide, nitrogen oxides, and particulate matter. Living near coal-fired power plants is linked to higher rates of respiratory and cardiovascular disease, and cancer, and premature death.

According to a study published this week in the journal *Nature Energy*, when those plants shut down or upgrade their emissions controls, rescue inhaler use, emergency room visits and hospitalizations for asthma all decrease among nearby residents. The study is the first to show decreased inhaler use following a reduction in pollution from coal plants, and builds on previous evidence that living near these facilities leads to increased asthma exacerbations.

The study was conducted between 2012 and 2017 in Kentucky, which ranks among the top U.S. states for air pollution from power generation. Researchers focused on Jefferson County, where one coal-fired power plant shut down and three others upgraded emission controls around the same time, and found that inhaler use, ER visits, and hospitalizations all fell—in some zip codes by up to 55 percent—following the reduction in emissions.

Living near coal-fired power plants is linked to higher rates of respiratory and cardiovascular disease, and cancer, and premature death.

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“We saw about three fewer emergency department visits and hospitalizations per quarter per zip code,” Joan Casey, assistant professor at the Columbia University Mailman School of Public Health and lead author on the study, told EHN. “That translates into about 400 prevented asthma-related hospital visits per year across the county.”

While many studies have looked at health impacts associated with living near coal-fired power plants, this is the first to use digital sensors to track rescue inhaler use among the same group of people before and after a drastic reduction in emissions. They did this by attaching sensors to rescue inhalers distributed among Louisville residents with asthma and chronic obstructive pulmonary disease, commonly referred to as COPD, starting in 2012. The sensors tracked the date, time, and location of each inhaler puff.

The researchers had data for 207 participants before and after the installation of “scrubbers,” or emission reduction equipment, at the three coal-fired power plants in 2016. Comparing people to themselves before and after the pollution reduction allowed them to control for factors like socioeconomic status, underlying conditions, indoor air quality, age, etc., which is harder to do with hospital data, Casey said.

In the months following scrubber installation, Casey and her colleagues saw an average reduction of inhaler use of about 17 percent, with continued declining use after that.

“A lot of studies have shown that populations living near coal-fired power plants have higher rates of respiratory hospitalizations,” Casey said, “but it’s been difficult to attribute those directly to coal-fired power plants because poor communities of color tend to be located closer to these facilities in the U.S., and they have a higher burden of diseases like asthma and COPD.”

Because of the “natural experiment” created by the drastic change in emissions and the addition of the inhaler data, Casey believes their research more definitively links asthma attacks and resulting hospital visits to unchecked emissions from coal-fired power plants.

“All of that information together convinced us that what we were seeing was probably real,” she said.

Rolling back regulations

Coal-fired power plants have been decommissioned at increasing rates each year as the cost of other power sources, like natural gas and renewables, become cheaper.

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As of December 2018 (the most current data available), there were 336 predominantly coal-fired power plants still in operation in the U.S., according to the U.S. Energy Information Administration.

It's likely that similar improvements in asthma outcomes occurred in communities across the U.S. during the same time period of the study, thanks to a sweeping change in pollution regulations.

In 2014, coal-fired power plants accounted for 63 percent of sulfur dioxide emissions in the nation. The 2012 federal Mercury and Air Toxics (MATS) rule required all coal-fired plants to install scrubbers that reduce toxics like mercury and sulfur dioxide in emissions by 2015 (or 2016 if they got a special extension). During 2015, plants that had recently installed this equipment reduced their sulfur dioxide emissions by 49 percent.

"I think our findings are exciting," Casey said, "because we're seeing that the cost to install these scrubbers can be made back quickly just through prevented healthcare visits. We're only looking at asthma here, but we know there are other related health outcomes as well, so the benefits are likely far greater than what we're estimating."

But despite these benefits—and the fact that these pollution controls have already been successfully installed at coal-fired power plants across the country—the current U.S. Environmental Protection Agency administration intends to roll back the MATS rule, undoing the regulations that have kept people in places like Jefferson County, Kentucky, healthier.

The administration also recently announced plans to suspend enforcement of environmental regulations during the coronavirus pandemic.

"It's disappointing to see the EPA suspend enforcement of environmental laws during the COVID-19 pandemic," Casey said, "especially as we're starting to see stark disparities in COVID deaths among the same groups—communities of color and the poor—that face the greatest respiratory harm from pollution, including coal-fired power plants. We should be tightening environmental regulations, not abandoning them during this time."

ehn.org, 15 April 2020

<https://www.ehn.org>

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Flamingos have friends, enemies, and even romantic trysts, 5-year study reveals

2020-04-14

Pick out any one flamingo in a colony, and you might be looking at a joker, a philanderer, or a friend. Flamingos, it turns out, **have social systems to rival our own**, according to a new study published today in Behavioral Processes. Researchers monitored the behavior of four species—the Caribbean, Chilean, Andean, and lesser flamingos—over 5 years. In each species, individual flamingos had ongoing **romantic partners, same-sex friendships (pictured), and even nemeses**, The Guardian reports. These relationships were stable over time, differing from many other birds that form temporary bonds from year to year. Given that flamingos can live for decades in inhospitable environments, they likely put effort into maintaining these social networks throughout their lives, leaning on their friends when times get tough.

sciencemag.org, 14 March 2020

<https://www.sciencemag.org>

The secret call of the wild: how animals teach each other to survive

2020-04-09

Sam Williams' Macaw Recovery Network in Costa Rica rewilds captivity-hatched fledgling scarlet and great green macaws. But introducing young birds into a complex forest world – bereft of the cultural education normally provided by parents – is slow and risky.

For 30 years or so scientists have referred to the diversity of life on Earth as “biological diversity”, or just “biodiversity”. They usually define biodiversity as operating at three levels: the diversity of genes within any particular species; the diversity of species in a given place; and the diversity of habitat types such as forests, coral reefs, and so on. But does that cover it? Not really. A fourth level has been almost entirely overlooked: cultural diversity.

Culture is knowledge and skills that flow *socially* from individual to individual and generation to generation. It's not in genes. Socially learned skills, traditions and dialects that answer the question of “how we live here” are crucial to helping many populations survive – or recover. Crucially, culturally learned skills vary from place to place. In the human family many

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cultures, underappreciated, have been lost. Culture in the other-than-human world has been almost entirely missed.

We are just recognising that in many species, survival skills must be learned from elders who learned from *their* elders. Until now, culture has remained a largely hidden, unrecognised layer of wild lives. Yet for many species culture is both crucial and fragile. Long before a population declines to numbers low enough to *seem* threatened with extinction, their special cultural knowledge, earned and passed down over long generations, begins disappearing. Recovery of lost populations then becomes much more difficult than bringing in a few individuals and turning them loose.

Many young birds learn much by observing their parents, and parrots probably need to learn more than most. Survival of released individuals is severely undermined if there are no free-living elder role models. Trying to restore parrot populations by captive breeding is not as easy as training young or orphaned creatures to recognise what is food while they're in the safety of a cage – then simply opening the door. "In a cage," Williams says, "you can't train them to know where, when and how to *find* that food, or about trees with good nest sites." Parents would normally have done exactly that.

A generational break in cultural traditions hampered attempts to reintroduce thick-billed parrots to parts of south-west America, where they'd been wiped out. Conservation workers could not teach the captive-raised parrots to search for and find their traditional wild foods, skills they would have learned from parents.

Landscapes, always complex, are under accelerated change. Culture enables adaptation far faster than genes alone can navigate hairpin turns in time. In some places, pigeons and sparrows have learned to use motion-sensors to get inside enclosed shopping malls and forage for crumbs. Crows have in some locales learned to drop nuts on the road for cars to crack. In at least one area they do this at intersections, so they can safely walk out and collect their cracked prizes when the light turns red and the cars stop. They've developed answers to the new question: "How can we survive here, in this never-before world?"

Because the answers are local, and learned from elders, wild cultures can be lost faster than genetic diversity. When populations plummet, traditions that helped animals survive and adapt to a place begin to vanish.

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In a scientific article on the vocabulary of larks living in north Africa and Spain titled, "Erosion of animal cultures in fragmented landscapes", researchers reported that as human development shrinks habitats into patches, "isolation is associated with impoverishment". They write: "Song repertoires pass through a cultural bottleneck and significantly decline in variety."

Unfortunately, isolated larks are not an isolated case. Researchers studying South America's orange-billed sparrow found that sparrow "song complexity" – the number of syllables per song and song length – deteriorated as humans continued whittling their forests into fragments. When a scientist replayed 24-year-old recordings of singing male white-crowned sparrows at the same location she'd recorded them, they elicited half the responses they had when first recorded. The birds' responses show that changes in the dialect lead to changes in listener preference, a bit analogous to pop music. And as with humans, preferences can affect whether a particular bird will be accepted as a mate. White-crowned sparrows singing a local dialect become fathers of more offspring than do singers of unfamiliar dialects, indicating females prefer a familiar tune.

I'm not just talking about a few songs. Survival of numerous species depends on cultural adaptation. How many? We're just beginning to ask such questions. But the preliminary answers indicate surprising and widespread ways that animals survive by cultural learning. Regionally different vocalisations are sometimes called "song traditions" but the more commonly used word is "dialects". More than a hundred studies have been published on dialects in birds. And it's not just birds but a wide array of animals including some fish.

"Cod particularly," said Steve Simpson of the University of Exeter, "have very elaborate calls compared with many fish." You can easily hear differences in recorded calls of American and European Atlantic cod. "This species is highly vocal with traditional breeding grounds established over hundreds or even thousands of years." Many fish follow elders to feeding, resting and breeding areas. In experiments, introduced outsiders who learned such preferred locales by following elders continued to use these traditional routes after all the original fish from whom they learned were gone.

Cultural survival skills erode as habitats shrink. Maintaining genetic diversity is not enough. We've become accustomed to a perilous satisfaction with precariously minimal populations that not only risk

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genetic viability of populations but almost guarantee losing local cultural knowledge by which populations have lived and survived.

In all free-living parrots that have been studied, nestlings develop individually unique calls, learned from their parents. Researchers have described this as “an intriguing parallel with human parents naming infants”. Indeed, these vocal identities help individuals distinguish neighbours, mates, sexes and individuals; the same functions that human names serve.

Williams tells me that when he studied Amazon parrots, he could hear differences between them saying, essentially, “Let’s go”, “I’m here, where are you?” and “Darling, I just brought breakfast”. Researchers who develop really good ears for parrot vocalisation and use technology to study recordings show that parrot noise is more organised and meaningful than it sounds to beginners like me. In a study of budgerigars, for instance, birds who were unfamiliar with each other were placed together. Groups of unfamiliar females took a few weeks for their calls to converge and sound similar. Males copied the calls of females. Black-capped chickadees flock members’ calls converge, so they can distinguish members of their own flock from those of other flocks. The fact that this happens, and that it takes weeks, suggests that free-living groups must normally be stable, that groups have their own identity, and that the members identify with their group.

Group identity, we see repeatedly, is not exclusively human. Sperm whales learn and announce their group identity. Young fruit bats learn the dialects of the crowds they’re in. Ravens know who’s in, who’s out. Too many animals to list know what group, troop, family or pack they belong with. In Brazil, some dolphins drive fish toward fishermen’s nets for a share of the catch. Other dolphins don’t. The ones who do, sound different from the ones who don’t. Various dolphin groups who specialise in a food-getting technique won’t socialise with other groups who use different techniques. And orca whales, the most socially complex non-humans, have layered societies of pods, clans and communities, with community members all knowing the members of all their constituent pods, but each community scrupulously avoiding contact with members of another community. All this social organisation is learned from elders.

Elders appear important for social learning of migratory routes. Various storks, vultures, eagles and hawks all depend on following the cues of elders to locate strategic migration flyways or important stopover sites. These could be called their migration cultures. Famously, conservationists

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have raised young cranes, geese and swans to follow microlight aircraft as a surrogate parent on first migrations. Without such enculturation, they would not have known where to go. The young birds absorbed knowledge of routes, then used them in later seasons on their own self-guided migrations. Four thousand species of birds migrate, so Andrew Whiten of the University of St Andrews in Scotland speculates that following experienced birds may be an underappreciated but “very significant realm of cultural transmission”.

When you look at free-living animals, you don't usually see culture. Culture makes itself visible when it gets disrupted. Then we see that the road back to reestablishing cultures – the answers to the questions of “how we live in this place” – is difficult, often fatal.

Young mammals too – moose, bison, deer, antelope, wild sheep, ibex and many others – learn crucial migration routes and destinations from elder keepers of traditional knowledge. Conservationists have recently reintroduced large mammals in a few areas where they've been wiped out, but because animals released into unfamiliar landscapes don't know where food is, where dangers lurk, or where to go in changing seasons, many translocations have failed.

Williams describes his procedure with the macaws as “very much a slow release”. First his team trains the birds to use a feeder. With that safety net, they can explore the forest, gain local knowledge, begin dispersing and using wild foods.

Some rescue programmes declare success if a released animal survives one year. “A year is meaningless for a bird like a macaw that doesn't mature until it's eight years old,” says Williams.

I ask what they're doing for those eight long years.

“Social learning,” Williams replies immediately. “Working out who's who, how to interact, like kids in school.”

To gain access to the future, to mate and to raise young, the birds Williams is releasing must enter into the culture of their kind. But from whom will they learn, if no one is out there? At the very least they must be socially oriented to one another. Ex-pets are the worst candidates for release; they don't interact appropriately with other macaws, and they want to hang around near humans.

To assess the social abilities of 13 scarlet macaws who were scheduled for release, Williams and his crew documented how much time they spent

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close to another bird, how often they initiated aggression, things like that. When the bird scoring lowest for social skills was released, he flew out the door and was never seen again. The next-to-lowest didn't adapt to the free-living life and had to be retrieved. The third-lowest social scorer remained at liberty but stayed alone a lot. The rest did well.

All of the above adds up to this: a species isn't just one big jar of jellybeans of the same colour. It's different smaller jars with differing hues in different places. From region to region, genetics can vary. And cultural traditions can differ. Different populations might use different tools, different migration routes, different ways of calling, courting and being understood. All populations have their answers to the question of how to live where they live.

"Sometimes a group will be foraging in a tree," Williams says. "A pair will fly overhead on a straight path. Someone will make a contact call, and the flying birds will loop around and land with the callers. They seem to have their friends." Bottom line, said Williams, there is much going on in the social and cultural lives of his macaws and other species, much that they understand – but we don't. We have a lot of questions. The answers must lurk, somewhere, in their minds.

As land, weather and climate change, some aspects of cultural knowledge will be the tickets necessary for boarding the future. Others will die out. Across the range of chimpanzees, cultures vary greatly, as do habitats. All populations but one use stick tools. Some use simple probes, others fashion multi-stick toolsets. Only one population makes pointed daggers for hunting small nocturnal primates called bush-babies hiding in tree holes. Only the westernmost chimpanzees crack nuts with stones.

As researchers have noted, distinctive tool-using traditions at particular sites are defining features of unique chimpanzee cultures. Whiten wrote: "Chimpanzee communities resemble human cultures in possessing suites of local traditions that uniquely identify them ... A complex social inheritance system that complements the genetic picture."

Some chimpanzee populations have learned to track the progress of dozens of specific trees ripening in their dense forests. Others live in open semi-savannah. Some are more aggressively male-dominated, some populations more egalitarian. Some almost never see people; some live in sight of human settlements and have learned to crop-raid at night. For a long, long time chimpanzees have been works in progress. "We've learned," writes Craig Stanford, "not to speak of 'The Chimpanzee.'" Chimpanzees vary and chimpanzee culture is variable at every level.

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"It's not just the loss of populations of chimps that worries me," Cat Hobaiter emphasised when I spent several weeks with her studying chimpanzees in Uganda. "I find terrifying the possibility of losing each population's unique culture. That's permanent."

Diversity in cultural pools – perhaps more crucially than in gene pools – will make species survival more likely. If pressures cause regional populations to blink out, a species' odds of persisting dim.

Williams' goal is to re-establish macaws where they range no longer, in hopes that they, and their forests, will recover. (Most of the central American forests that macaws need have been felled and burned, largely so fast-food burger chains can sell cheap beef.) It often takes a couple of generations for human immigrant families to learn how to function effectively in their new culture; it may take two or three generations before an introduced population of macaws succeeds. In other words, macaws are born to be wild. But *becoming* wild requires an education.

So what's at stake is not just numbers. What's at stake is: ways of knowing how to be in the world. Culture isn't just a boutique concern. Cultural knowledge is what allows many populations to survive. Keeping the knowledge of how to live in a habitat can be almost as important to the persistence of a species as keeping the habitat; both are needed. Cultural diversity itself is a source of resilience and adaptability to change. And change is accelerating.

[theguardian.com](https://www.theguardian.com), 9 April 2020

<https://www.theguardian.com>

Making cities smarter

2020-04-09

According to several predictions, urban areas will see a population increase of 2.5 billion people by 2050. When combined with the rise of smart and connected cities, this growth in urban population is posing a new set of complex security and safety challenges to city administrators, urban planners, municipal governments and businesses alike. How can they put systems and processes in place that keep the population safe – while not restricting growth, commerce or the flow of daily life? How do expansive metropolises like Tokyo, the largest city in the world, maintain safety while allowing their population to flourish?

The Role of Technology

When it comes to enhancing public safety, and maintaining security, having a complete view of your environment is critical.

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When it comes to enhancing public safety, and maintaining security, having a complete view of your environment is critical. A unified solution that provides a common operating picture enhances situational awareness and allows better planning, detection, response and prevention of incidents. These types of systems combine public safety data and technology tools to bolster situation awareness.

Unified data and sensor visualization platforms offer cities the tools they can use to improve overall public safety. And if they choose a provider that offers the latest in technology, this solution will make the city both safe and smart. A unified system consolidates data from a variety of public and private sources to enhance the overview for dispatchers and emergency responders so they can make insight-driven decisions. By reviewing data, institutions can make predictive changes to the allocation and deployment of resources to improve and create best practices, plan for the worst, determine any weak spots and shore up defenses.

Cities need a solution that can allow public organizations to work closely with law enforcement to develop an emergency response plan where video surveillance streams and other data from IoT sensors can be correlated, analyzed and shared quickly with relevant parties. Specifically, these unified systems can deliver the capability to improve traffic and mobility operations. For example, when you combine traffic systems with video surveillance, it can help law enforcement better coordinate incident response. This scenario would allow responders to better spot incidents, communicate detours and respond faster – resulting in smoother traffic flow and happier citizens.

securitytoday.com, 9 April 2020

<https://www.securityday.com>

Why strength training may be the best thing you can do for your health

2020-04-15

I AM lying on my living room floor, my whole body shaking, along with 30 strangers, who I can just about glimpse on little squares on my laptop screen. If you would have told me a month ago this would be my new workout routine, I would have laughed you out of the room. Until now, fitness for me meant getting out and about, religiously racking up steps on my pedometer. Then London went into lockdown, and for the past few

Our muscle strength peaks in our 30s, then slowly declines.

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weeks I have barely left the house. But here's the thing – in terms of health benefits, my new exercise regime is through the roof.

Unwittingly, these strange times have forced my habits in line with the latest thinking in exercise science. Aerobic exercise was once seen as the holy grail of fitness, but another kind of workout is just as important – if not more so. Something we can all do from the comfort of our homes without any equipment: strength training.

Our muscle strength peaks in our 30s, then slowly declines. Eventually, it can drop so much that we are unable to get out of chairs or climb stairs. It isn't just older people who would benefit from improving their strength, though. We are discovering unexpected health boosts from building muscle for all adults that go way beyond simply being strong.

Strength training could add years of life and protect you from some major killers. Having stronger muscles seems to decrease the chance of getting cardiovascular disease, type 2 diabetes and cancer. There is even evidence that it can improve your memory and prevent cognitive decline.

Its importance is so great that the UK government's latest physical activity guidelines emphasise muscle strengthening over aerobic workouts. "It's an urgent message that needs to get through," says Stuart Gray, who studies metabolic diseases at the University of Glasgow, UK. "People need to know that strength training is important at any age."

When it comes to fitness, muscle power has long played second fiddle to aerobic exercise, perhaps because of the misguided idea that weight training is simply for bulking up. On the other hand, the health boost that comes with aerobic exercise is much touted, so most people focus on getting the recommended 150 minutes of aerobic activities a week – running, brisk walking, swimming or anything that gets your heart pumping and you breathing faster.

That began to change more than a decade ago, and in 2011, UK exercise guidelines stated for the first time that all adults should perform muscle strengthening activities two days a week. Yet while getting physically strong became much more mainstream among regular gym goers, nobody else took much notice. "People just remembered the first line about aerobic activities," says Jason Gill, also at the University of Glasgow. "The second line was forgotten."

"When it comes to fitness, muscle power has long played second fiddle to aerobic exercise"

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It is a big oversight. About 50 per cent of the UK population fail to get enough aerobic exercise and only 25 per cent get enough strength exercise. It is a similar story in the US, despite physical activity guidelines from both the US government and the World Health Organization also recommending a least two sessions of strengthening activities per week.

At least some benefits of strong muscles have been appreciated for centuries (even Socrates told his disciples that it was a disgrace to grow old without developing their physical strength to the highest limit), but it is only recently that we have come to appreciate just what our muscles can do for our health.

Age-related muscle loss happens to everyone. Around the age of 30, we start to lose up to 5 per cent of our muscle mass each decade, and this accelerates at 70 (see “Strength vs age”). This effect was first brought under the spotlight by Irwin Rosenberg of Tufts University in Massachusetts back in 1988 after he attended a meeting on ageing. In his notes on the meeting, he wrote that “no decline with age is more dramatic or potentially more functionally significant than the decline in lean body mass. Why have we not given it more attention?”

“Strength training uses up calories even after the exercise is over”

That time has finally come, and we now have a good picture of what happens to muscles as we age. Over time, the kinds of fibres in our muscles change, with “type two” fibres, which help us bear heavy loads for short spells, slowly being replaced with more “type one” fibres that are more efficient over long periods but less able to carry weight. Our muscles also stop using protein as efficiently and so are less able to repair themselves. These age-related changes have many causes, including alteration in the levels of hormones such as testosterone, and a reorganisation of brain cells that control movement.

In the past, efforts to tackle muscle loss were focused on people in their later years, but now a mountain of evidence points to the benefits of fighting muscle wastage throughout life.

The best evidence comes from studies of the exercise habits of large numbers of people. One showed that lifting weights for less than an hour a week reduces the risk of heart attack and stroke by up to 70 per cent – independent of any aerobic training. Another study of 100,000 women found that those who did at least an hour a week of strength training significantly lowered their risk of type 2 diabetes. And people with better grip strength – a proxy for overall muscle strength – have a lower risk of

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cardiovascular disease and cancer and are at reduced risk of premature death by any cause.

One reason stronger muscles keep us healthier is that they help prevent the debilitating effects of wobbles, falls and problems moving, increasing well-being in the process. For instance, when residents at a nursing home performed one set of six resistance machine exercises (see “Resistance isn’t futile”), twice a week for 14 weeks, they not only increased their overall strength by 60 per cent, but also improved their ability to live independently by having the power to cope with everyday activities like getting to the bathroom.

Muscle also plays an important role in regulating the body’s glucose levels. With the help of insulin, it soaks up glucose from the blood and stores it in the form of glycogen. Bigger muscles mean a bigger sink for glucose and a higher number of cells that transport and clear glucose from the body, which all helps ward off type 2 diabetes, in which blood glucose levels become too high.

And while you don’t have to look like a bodybuilder to reap the benefits, having bigger muscles is also linked with better survival rates for people with cancer, probably because the disease decreases muscle mass, so it is helpful to have a bigger resource to start with to keep the body going for longer.

Another surprising benefit of strength training is how it burns calories, even after the exercise is over. Weight training increases your basal metabolic rate – the amount of energy your body consumes when at rest – in two ways. First, bigger muscles require more energy to fuel their tissue maintenance. So simply having more muscle mass uses more calories. Second, in the short term, lifting weights causes tiny tears in your tissue that require a relatively large amount of energy to remodel. This increase in energy demand can last three days after a workout.

Let’s say I fit in two 20-minute resistance training workouts a week. Each online session requires about 200 extra calories to perform, but over the next three days, I will use another 100 extra calories a day to help repair my muscles. Over the month, my two workouts a week have consumed a whopping 5000 extra calories – without even leaving the house.

All of this helps if you want to decrease body fat, a factor associated with lower cholesterol, lower blood pressure and improved insulin sensitivity and glucose control, all of which contribute to a decreased risk of type 2

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diabetes and cardiovascular disease. This is one of the reasons why getting stronger protects you from heart attacks.

But strength training really trumps aerobic exercise with its effect on bone. Our bones start to degrade as we age, losing mass and making us more prone to fractures. Aerobic exercise is beneficial to a lot of systems in the body, but there is little evidence that it protects us from bone loss.

Our bones are in a constant flux of being broken down by cells called osteoclasts and being built up again with osteoblasts. Strength training places stress on the bones, triggering the activity of osteoblasts and inhibiting osteoclasts, helping us to maintain, and even build, denser bones. This significantly lowers the risk of osteoporosis, which causes around 1.66 million hip fractures globally every year.

Mind gym

If that weren't enough to convert you to boot-camp classes over going running, building muscle can also boost your brain. Several studies show that people with a better grip strength – hence better overall body strength – score higher on tests of memory and reaction time, as well as on assessments of verbal and spatial abilities. This means that grip strength can be used as a marker of cognitive decline.

It seems there is something special about muscle training specifically, rather than exercise in general. For instance, older women who lifted weights once a week for a year had significant improvements in cognitive tests of attention, compared with women who performed balance and toning classes. The underlying mechanisms aren't fully understood, but strength training seems to trigger the release of several brain chemicals, including one called BDNF, that support the health of neurons, helping them to communicate, grow and resist age-related decline, all contributing to a healthier brain.

All major muscles

What's the best way to reap the benefits? There is no easy answer, says Gray. It is trickier than it is to tell people to get 150 minutes of aerobic exercise a week, because the type of strength exercises a person can do will differ wildly depending on their age and circumstances.

That said, advice from the American College of Sports Medicine couldn't be simpler: it says that adults should perform strength exercises on all major muscle groups – legs, hips, back, abdomen, chest, shoulders and arms – at least twice a week.

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That advice comes from evidence that your first workout of the week will give you the most benefit compared with nothing at all. Your second workout will give a bit more benefit, as will the third, but then the results plateau.

But don't get carried away in the details of what you are doing in these sessions, Gill says: "If you exercise a particular group of muscles until it's tired, it doesn't really matter how heavy the weight is or how many times you lift it. The benefits for a non-athlete are broadly the same whether you lift a light weight 20 times, or a heavy weight five times."

Determined to make things even simpler, Gill's group is testing whether tiny amounts of exercise a day can make a difference to health. "The idea is, if you can do 1 minute of each exercise a day, press-ups Monday, squats Tuesday, then it's a way to build resistance exercise into your week very easily," he says. You could even boost your muscle strength without lifting a finger (see "Bluff your way to buff").

Like most things in life, a balance of activities is best. "Both aerobic and strength exercises seem to boost our health in slightly different ways, and most studies point to a bit of both being better than either alone," says Gill.

The heart, for instance, responds to both strength and aerobic training, but the two kinds of exercise cause it to adapt in a different way structurally, says Georgina Ellison-Hughes at King's College London, who specialises in regenerative muscle physiology. "If you ask anybody who works in cardiovascular health, they'd say a balance between the two is a good place to be," she says. And remember that many aerobic activities, which get the heart rate up, are also good for muscle strength, such as circuit training and dancing.

Let's not overthink it, says Gray. Anything is better than nothing, and little things squeezed into your everyday routine can make a big difference, without the need for any equipment. "You can do press-ups on the floor at home, or against the kitchen worktop, or the wall if you're not able to do that," he says. "You can do squats and lunges to strengthen your legs in front of the TV, and lifting shopping bags or children certainly counts."

Whatever you do, just make sure it wears you out, he says. "If you just do whatever strength exercise gets you knackered in a reasonable amount of time, you'll probably get the same benefit to your health as if you were following a highly specific training routine." After a short boot-camp session online, I'm certainly feeling the burn. And the best bit about

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getting strong during lockdown? When your muscles are aching, it isn't far to hobble to bed.

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