

Bulletin Board

Contents

AUG. 20, 2021

(click on page numbers for links)

REGULATORY UPDATE

ASIA PACIFIC

NSW spray drift pilot program.....	4
Sri Lanka relaxes fertilizer ban	5

AMERICA

Minnesota adopts CARB standards	6
FDA seeks comments on regulation of kratom, 6 other drugs.....	7
Volatile compounds from personal products drive urban ozone chemistry	8
Our view: Feds should limit 'forever chemicals'.....	9

EUROPE

EC publishes report on use of nanomaterials in cosmetics and review of cosmetics regulation regarding nanomaterials.....	10
Will the UK follow the EU in enforcing animal tests on some cosmetic ingredients?.....	12

REACH UPDATE

Restrictions	13
--------------------	----

JANET'S CORNER

Pavlov's Dog	14
--------------------	----

HAZARD ALERT

Tetrachloroethylene	15
---------------------------	----

GOSSIP

Cuttlefish remember details of their last meal, study finds	21
Shape-shifting fish that confounded scientists for 100 years spotted off California coast	22
A well-known wildflower turns out to be a secret carnivore.....	24
Highest recorded temperature in European history reported in Italy	25
3 men die in a manure pit: Here's why it's a 'death trap'.....	27

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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.**

Bulletin Board

Contents

AUG. 20, 2021

Hundreds of UK and EU cosmetics products contain ingredients tested on animals.....	28
US to recommend COVID-19 vaccine booster shots 8 months post-vaccination	31
Pu calculated to a record0breaking 62.8 trillion digits.....	32
Chlorpyrifos pesticide to be banned in the US, Environmental Protection Agency says.....	34
COVID-19 could mix up body's 'fight-or-flight' system.....	35

CURIOSITIES

Colds and other common respiratory diseases might surge as kids return to school.....	38
How artificial intelligence can help save us from air pollution.....	41
Here's why you need to wash your hands for 20 seconds, according to physics.....	44
Engineers uncover the secrets of fish fins	45
Ripples in rats' brains tied to memory may also reduce sugar levels	48
TGA tests Australian sunscreens for cancer-causing chemicals following US studies.....	49
Mount Etna is 100 feet taller than it was 6 months ago.....	51
Scientists have a new word for birds stealing animal hair	52
Esperance echidna 'spike' shows value of citizen science in face of changing climate.....	54
How deadly is the coronavirus delta variant?	56

TECHNICAL NOTES

(Note: Open your Web Browser and click on Heading to link to section) ...	58
CHEMICAL EFFECTS.....	58
ENVIRONMENTAL RESEARCH.....	58
OCCUPATIONAL.....	58
PHARMACEUTICAL/TOXICOLOGY	58

Bulletin Board

Contents

AUG. 20, 2021

Bulletin Board

Regulatory Update

AUG. 20, 2021

ASIA PACIFIC

NSW spray drift pilot program

2021-08-04

Modern product labels contain spray drift restraints, which may include mandatory buffer zones (also known as 'no spray zones'). These are determined by the Australian Pesticides and Veterinary Medicines Authority (APVMA) using the maximum use rate, minimum droplet size and other application parameters and calculated using the Spray Drift Management Tool (SDMT). A pilot program has been established to provide NSW applicators with access to a modified version of the SDMT so applicators can input site-specific information and calculate reduced buffer zones applicable to their local conditions and application preferences.

The main objective of the pilot is to identify the extent to which the SDMT is of practical benefit to applicators as well as other potential benefits, such as reducing reliance on increasingly complex labels and increasing understanding of the relationship between application parameters and off-target drift.

The APVMA has issued a permit (PER91156) for the pilot for a limited range of products, primarily in cereal and fallow situations. The permit will be held by Grain Producers Australia (GPA) who will be the point of contact for anyone interested in participating in the pilot program.

Applicators participating in the pilot will be asked by GPA to complete a questionnaire that will help inform the wider rollout of the SDMT and the future development of spray drift policy in Australia.

More information about the permit and how you can participate in the pilot and access the modified version of the SDMT can be found on the GPA website.

For more news and updates from the APVMA, visit our website.

[Read More](#)

APVMA, 4 August 2021

<https://apvma.gov.au/news-and-publications/news>

Bulletin Board

Regulatory Update

AUG. 20, 2021

Sri Lanka relaxes fertilizer ban

2021-08-03

The Minister of Finance Basil Rajapaksa today issued a gazette notification re-authorizing the import of several types of chemical fertilizers including urea for cultivation in the forthcoming Maha season.

Licensees will be permitted to import mineral or nitrogenous mixtures including urea, ammonium nitrate with calcium carbonate or other inorganic substances, superphosphates and mineral or chemical fertilizers containing two or all three elements nitrogen, potassium and phosphorus.

The Minister of Finance has issued a new gazette notification amending the earlier gazette notification banning the import of chemical fertilizers.

The Department of Import and Export Control states that this step was taken in accordance with the recommendations provided by the State Ministry of Organic and Natural Fertilizer Production, Supply and Regulation.

The Department of Agriculture states that this decision was taken following a proposal made by the Minister of Agriculture to import plant nutrients prepared using Chelated Mineral and Micro Nutrients and provide them to farmers.

The Department said the Gazette Notification No. 2226/48 prohibits the importation of Chelated Mineral and Micro Nutrients but will be imported under associated classification codes.

The importation of chemical fertilizers, pesticides and herbicides was banned by the President in a Cabinet Memorandum dated April 27, 2021 to promote the use of organic fertilizers for agricultural products.

Accordingly, the Department of Import and Export Control will continue to regulate the import of identified chemical fertilizers, pesticides and herbicides.

[Read More](#)

Colombo Page, 3 August 2021

http://www.colombopage.com/archive_21A/Aug03_1628012219CH.php

The rules don't take effect until Jan. 1, 2024, for 2025 models, so Minnesotans likely will not see an immediate burst of new electric vehicle options at dealerships.

Bulletin Board

Regulatory Update

AUG. 20, 2021

AMERICA

Minnesota adopts CARB standards

2021-07-27

Minnesota is the latest state — and the first in the Midwest — to adopt California's stricter tailpipe emission standards and mandate for automakers to get more zero-emission vehicles onto sales lots.

The rules don't take effect until Jan. 1, 2024, for 2025 models, so Minnesotans likely will not see an immediate burst of new electric vehicle options at dealerships. But the adoption sends a clear signal, and vehicle selection is expected to expand in the next 18 months.

Notice of official adoption of the rules was posted July 26 in the Minnesota State Register.

Gov. Tim Walz pushed hard for the clean car standards as part of his broader effort to combat the climate crisis and get Minnesota back on track to meeting greenhouse gas reduction goals set years ago by lawmakers.

Transportation is the state's leading source of heat-trapping global warming emissions, but electric vehicle sales have been minuscule in Minnesota.

That likely will change with Minnesota's new standards, and Walz marked the occasion with a quick victory lap tour at Phillips & Temro Industries — and a hockey analogy. The company makes battery warmers and home and commercial electric vehicle charging equipment at its Eden Prairie plant.

"Minnesotans certainly know that old adage, 'You need to skate where the puck is going to be,' "Walz told reporters after the tour. "The puck is going to be in EV vehicles, and that is irrefutable."

Walz was flanked by lawmakers and community leaders who advocated for the standards. Raj Rajan, chairman of the board of directors at St. Paul-based nonprofit Fresh Energy, said the new rules will stimulate clean energy investments, support jobs and improve public health, particularly for people of color disproportionately impacted by the air pollution from vehicles.

Bulletin Board

Regulatory Update

AUG. 20, 2021

Read More

Transport Topics, 27 July 2021

<https://www.ttnews.com/articles/minnesota-adopts-carb-standards>**FDA seeks comments on regulation of kratom, 6 other drugs**

2021-07-26

Kratom, a popular but unregulated psychotropic herbal extract, is one of seven currently unscheduled psychotropic drugs that will be reviewed by the World Health Organization (WHO) under the provisions of the international psychotropic convention to which the US is a party.

WHO notified the US and other international parties to the 1971 convention that the seven new psychotropic drugs may be added to its list of scheduled drugs. By law, that notification triggers a requirement that the secretary of the US Department of Health and Human Services (HHS) publish a request for comments in the Federal Register.

These substances "have never been formally reviewed by WHO and are not currently under international control," wrote WHO in notifying the US and other nations of its intent to review the drugs. "Information was brought to WHO's attention that these substances are clandestinely manufactured, of especially serious risk to public health and society, and of no recognized therapeutic use."

Two novel synthetic opioids, buprenorphine and metonitazene, are scheduled for review at the October meeting of WHO's expert committee on drug dependence (ECDD). The synthetic cannabinoid receptor agonist 4F-MDMB-BICA, or 4F-MDMB-BUTICA, is also scheduled for review.

Two "designer drugs" that function as stimulants, eutylone or bk-EBDB, and BMDP, are also up for review by ECDD. BMDP's chemical name is 3,4-Methylenedioxy-N-benzylcathinone and it is also known as benzilone.

Kratom, along with its two active substances, mitragynine and 7-hydroxymitragynine, are in pre-review status, according to WHO. The pre-review process determines whether sufficient evidence exists to bring the substance before the ECDD for a formal review; "findings at this stage should not determine whether the control status of a substance should be changed," according to the WHO notification.

WHO notified the US and other international parties to the 1971 convention that the seven new psychotropic drugs may be added to its list of scheduled drugs

Bulletin Board

Regulatory Update

AUG. 20, 2021

One medicine, phenibut (beta-phenyl-gamma-aminobutyric acid HCl), is also in pre-review. Phenibut is currently used in Russia to treat alcohol withdrawal, as well as anxiety, insomnia and vestibular disorders, according to the Federal Register notification. It has no medical use in the US but is available online without a prescription.

The ECDD's meetings, at which the group "conducts medical, scientific, and public health evaluations of the selected psychoactive substances using the best available information," are closed to the public, but WHO member states may participate in an ECDD open session slated for 11 October.

Member states are asked to complete a questionnaire about the substances under review, so EDCC can form an assessment on the status and current use patterns of the drugs in each country. Member states can also provide additional relevant information.

According to the 19 July Federal Register notice, the US Food and Drug Administration (FDA) plans to defer any recommendations regarding whether the drugs should be moved to a controlled class until WHO makes official recommendations to its Commission on Narcotic Drugs.

[Read More](#)

REgulatory Focus, 26 July 2021

<https://www.raps.org/news-and-articles/news-articles/2021/7/fda-seeks-comments-on-regulation-of-kratom-6-other>

Volatile compounds from personal products drive urban ozone chemistry

2021-08-04

Emissions from products like deodorant and lotion played a major role in 2018 high ozone levels in New York.

Personal care products like deodorant and lotion contain volatile organic compounds (VOCs) that add fragrance or texture—and these can be emitted into the air. Now, research suggests that in densely populated areas, these emissions have significant implications for air quality. During summer 2018, volatile chemical products played just as important a role in driving high ozone pollution levels in New York City as did volatile organic compounds (VOCs) produced by fossil fuel burning (Proc. Natl. Acad. Sci. USA 2021, DOI: 10.1073/pnas.2026653118).

Bulletin Board

Regulatory Update

AUG. 20, 2021

Ground-level ozone is a respiratory irritant and results when nitrogen oxides, mostly from vehicle tailpipes, react with VOCs in the presence of sunlight. Historically, most of those VOCs, such as benzene, have also come from fossil fuel combustion. VOCs such as pinene and limonene emitted by forests in the summer can also drive ozone chemistry. Decades of regulation have reduced vehicle emissions and have led to better air quality, says Matthew Coggon, an atmospheric chemist at the National Oceanic and Atmospheric Administration and a leader of the research. "But we still have ozone exceedances in megacities. What's the cause?"

Chemists have been examining the role of volatile chemical products in ozone formation since the 1990s. These compounds, he says, are petrochemicals, and are found in a huge variety of products, including industrial solvents and personal care products. But Coggon says figuring out the importance of these compounds relative to VOCs from other sources has been challenging without sensitive measurements.

Coggon and his team drove a mobile lab, equipped with a proton transfer reaction time-of-flight mass spectrometer, around American cities including New York and Chicago, and European cities including Bern and Vienna. The team used relative ratios of tracer molecules to assign VOC signatures to different sources. High levels of benzene meant measured volatiles were likely a product of fossil fuel combustion. And high levels of decamethylcyclopentasiloxane (D5-siloxane), whose primary sources are antiperspirants and hair care products, meant other associated volatiles were also probably from personal care products. Volatile personal care product emissions, Coggon says, were correlated with population density.

[Read More](#)

c&en, 4 August 2021

<https://cen.acs.org/environment/atmospheric-chemistry/Volatile-compounds-personal-products-drive/99/i29>

Our view: Feds should limit 'forever chemicals'

2021-08-04

If failed or nonexistent policies to protect people from the spread of COVID-19 around the country weren't a potent enough example of the consequences of leaving science and health policy to the states, consider the dangers posed by per- and polyfluoroalkyl substances.

The synthetics widely used in manufacturing since World War II, in both stains and stain-resistant treatments, accumulate in the body. They are

And, until recently, they were mostly invisible when it came to regulation, too.

Bulletin Board

Regulatory Update

AUG. 20, 2021

tied to a litany of health problems, such as pregnancy complications and thyroid disease. But unlike litter gathered on the roadside, they're invisible. And, until recently, they were mostly invisible when it came to regulation, too.

In a vacuum, some states stepped up to address PFAS contamination, particularly in drinking water, and others are just now tackling the issue. New Hampshire and Massachusetts are among the leaders. But the federal government has largely taken a hands-off approach, issuing guidance for drinking water standards but no legal limit, as it does for 90 other chemical and bacterial contaminants from mercury to the tetrachloroethylene that swirls in the runoff from factories and dry cleaners.

A bill that cleared the U.S. House of Representatives in late July, supported by the Democratic majority and nearly two-dozen Republicans, would require the Environmental Protection Agency to issue national standards for PFAS contamination. This is the second time the House has passed the bill. The Senate should see to it that it isn't left to die on the vine again.

Michigan Rep. Debbie Dingell filed the legislation both times. According to the Detroit Free Press, she noted in a press conference after the bill passed the House most recently, on July 21, with a vote of 241-182, that the Pentagon has known about the dangers of PFAS to humans since the 1970s. Here we are, some 50 years later, with an advisory limit from the EPA for drinking water — 70 parts per trillion — but no regulation.

[Read More](#)

The Eagle Tribune, 4 August 2021

https://www.eagletribune.com/opinion/our-view-feds-should-limit-forever-chemicals/article_76dd2a4f-259a-56da-9f16-d3ee2f3d942d.html

EUROPE

EC publishes report on use of nanomaterials in cosmetics and review of cosmetics regulation regarding nanomaterials

2021-07-28

Pursuant to Article 16 (10) and (11) of Regulation (EC) No 1223/2009 (Cosmetics Regulation), the European Commission (EC) is required to submit to the European Parliament and the Council an annual status

Bulletin Board

Regulatory Update

AUG. 20, 2021

report on the use of nanomaterials in cosmetic products and to review the Regulation's provisions concerning nanomaterials. The [July 22, 2021, report](#) includes the following main findings:

- On average, ten new cosmetic products containing nanomaterials are placed on the European Union (EU) market every day; this is only a fraction of the 800 new cosmetic products notified daily in Cosmetic Products Notification Portal (CPNP). Overall, the use of nanomaterials concerns a rather limited number of all cosmetic products (about 1.5% of the total) and has been rather stable over the past five years;
- Most of the cosmetic products notified in the CPNP correspond to nanomaterials with a colorant or ultraviolet (UV) filter function;
- There are differences in the percentage of newly notified cosmetic products containing nanomaterials among EU countries (from 0.8% to 5.5%), as well as in the share of the overall notifications of nanomaterials (from 6.5% to 43.7%);
- The 2019 EC catalogue of nanomaterials "represented a rather accurate picture of the market, albeit with the inherent limitations stemming from the notification process"; and
- Most of the Scientific Committee on Consumer Safety's (SCCS) opinions on the safety of CPNP-notified nanomaterials were inconclusive due to the lack of or insufficient data. Therefore, there is a need for responsible persons to provide the most accurate information possible when notifying nanomaterials that are present in cosmetic products.

The report states that aligning the nanomaterial definition in the Cosmetics Regulation with a horizontal definition "could increase coherence between legislation but should be thoroughly assessed in order to evaluate its potential effects." According to the report, because of identified shortcomings in the notification process, the effectiveness of the current process via CPNP "merits specific attention, in particular the duration and effect of the expiry of the deadline as laid out in the Cosmetics Regulation." The report notes that the scientific safety assessment of nanomaterials "could be strengthened, in particular as experience has shown that the majority of the completed assessments by [SCCS] were inconclusive due to lack of data." Since most EU citizens "consider it important to be informed about the presence of nanomaterials in products they buy," the report suggests that digital labeling should

Overall, the use of nanomaterials concerns a rather limited number of all cosmetic products (about 1.5% of the total) and has been rather stable over the past five years[.]

Following Brexit, the UK now runs its own REACH system – called UK REACH – and Cruelty Free International noted that, because of this, the Home Office did not need to follow the Symrise case ruling.

Bulletin Board

Regulatory Update

AUG. 20, 2021

be considered to complement and improve further the labeling of nanomaterials in cosmetic products.

National Law Review, 28 July 2021

<https://www.natlawreview.com/article/ec-publishes-report-use-nanomaterials-cosmetics-and-review-cosmetics-regulation>

Will the UK follow the EU in enforcing animal tests on some cosmetic ingredients?

2021-08-11

The UK Home Office has admitted in a letter to animal protection organisation Cruelty Free International that it will allow animal testing on cosmetic-use only ingredients – a volte-face on the government's position for over two decades.

Such tests could occur in rare instances if deemed necessary to meet the requirements of chemicals regulations, as opposed to the requirements of the new UK Cosmetic Regulation, under which animal testing and marketing bans are imposed.

The Home Office said in the letter that it decided to adopt an approach akin to the European Chemicals Agency's (ECHA) Board of Appeal, which, in August 2020, made decisions regarding two appeals by German speciality chemicals company Symrise.

Symrise appealed against the ECHA's original instruction to carry out animal tests on two substances, used solely in cosmetic products, to satisfy the needs of the EU's pan-industry chemicals regulation REACH.

The Board of Appeal decided, against the wishes of Symrise, that the animal testing must be carried out to meet REACH requirements, arguing that the restrictions on animal testing under EU cosmetics laws do not prevent the need for REACH compliance.

Following Brexit, the UK now runs its own REACH system – called UK REACH – and Cruelty Free International noted that, because of this, the Home Office did not need to follow the Symrise case ruling.

In response to the Home Office letter, Dr Katy Taylor, Cruelty Free International's Director of Science and Regulatory Affairs, said: "This decision blows a hole in the UK's longstanding leadership of no animal testing for cosmetics and makes a mockery of the country's quest to be at

Bulletin Board

REACH Update

AUG. 20, 2021

Restrictions

2021-08-13

Consultations on SEAC draft opinion: 1

- Start date: 07/07/2021
- Deadline: 07/09/2021

Restriction proposals: 1

- Start date: 24/03/2021
- Deadline: 24/09/2021

Restriction proposals: 1

- Start date: 23/06/2021
- Deadline: 03/01/2022

Testing proposals

Testing proposals: 19

- Start date: 01/07/2021
- Deadline: 16/08/2021

ECHA, 13 August 2021

<https://echa.europa.eu/consultations/current>

Consultations on SEAC draft opinion: 1

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Bulletin Board

Janet's Corner

AUG. 20, 2021

Pavlov's Dog

2021-08-20

WWW.ANDERSTOONS.COM



Pavlov's dog



Schrödinger's cat



Einstein's hamster



Newton's parakeet

by:scotswal

<https://andertoons.com/science/cartoon/8630/pavlov-dog-einstein-hamster-schrodinger-cat-newton-parakeet>

undefined.

Bulletin Board

Hazard Alert

AUG. 20, 2021

Tetrachloroethylene

2021-08-20

Tetrachloroethylene (CAS No. 127-18-4) is also known as perchloroethylene, tetrachloroethene, and 1,1,2,2-tetrachloroethene and is often abbreviated to PER or PERC. Its molecular formula is C_2Cl_4 , and its relative molar mass is 165.8. At room temperature, tetrachloroethene is a clear, colourless liquid with an etheric odour. [1] It is nonflammable and mostly insoluble in water. [2]

USES [2]

The largest user of tetrachloroethylene is the dry cleaning industry. It is a large percentage of all dry cleaning fluid used. Textile mills, vapour degreasers and metal cleaning operations, and rubber coatings also use tetrachloroethylene. It can be added to solvent soaps, printing inks, adhesives, sealants, polishes, lubricants and silicones.

IN THE ENVIRONMENT [3]

Much of the tetrachloroethylene that gets into water or soil evaporates into the air. Microorganisms can break down some of the tetrachloroethylene in soil or underground water. In the air, it is broken down by sunlight into other chemicals or brought back to the soil and water by rain. It does not appear to collect in fish or other animals that live in water.

SOURCES OF EMISSION & ROUTES OF EXPOSURE

Sources of Emission [2]

- Industry sources: The primary sources of tetrachloroethylene emissions are the industries that manufacture it or use it in production. Some of the industries that use it in production are dry cleaners, the chemical industry, rubber manufacturers, heavy equipment manufacturing (degreasing), electroplating facilities (degreasing), pulp and paper manufacture (for de-inking paper), the manufacturers of inks. These are emissions to the air unless there is a spill.
- Diffuse sources: Other possible emitters of Tetrachloroethylene are degreasing operations, paint, varnish and lacquer removal, and consumer products containing Tetrachloroethylene. These are emissions to the air unless there is a spill.

Tetrachloroethylene (CAS No. 127-18-4) is also known as perchloroethylene, tetrachloroethene, and 1,1,2,2-tetrachloroethene and is often abbreviated to PER or PERC. Its molecular formula is C_2Cl_4 , and its relative molar mass is 165.8.

Bulletin Board

Hazard Alert

AUG. 20, 2021

- Natural sources: Tetrachloroethylene does not occur naturally in the environment.
- Transport sources: No major mobile sources, although it is possible to have emissions from clothes being transported from the dry cleaners.
- Consumer products: Aerosol paints, agricultural chemicals, automotive chemicals, furniture polish and cleaners, hard surface cleaners, rug carpet and upholstery cleaners, lubricating greases and oils, paint and varnish removers and thinners, textile finishes, typewriter correction fluids and waterproofing compounds.

Routes of Exposure [2,4]

The major exposure routes to tetrachloroethylene are :inhalation, skin absorption, ingestion, skin and/or eye contact. Tetrachloroethylene evaporates quickly and so the most common exposure is from breathing air containing it. It may also enter the body if we eat or drink food or water that has been contaminated. It does not pass through the skin. Workers in the industries that use or produce tetrachloroethylene are at risk of exposure. Consumers can be exposed to tetrachloroethylene by exposure to air from production and processing facilities using tetrachloroethylene, or drinking water from contaminated water. Consumers may also be exposed to tetrachloroethylene when using consumer products containing tetrachloroethylene, or by spending time in dry cleaning facilities using tetrachloroethylene or by bringing dry cleaned clothes into their homes.

HEALTH EFFECTS [5]

Acute Effects

Effects resulting from acute, inhalation exposure of humans to tetrachloroethylene vapours include irritation of the upper respiratory tract and eyes, kidney dysfunction, and at lower concentrations, neurological effects, such as reversible mood and behavioural changes, impairment of coordination, dizziness, headache, sleepiness, and unconsciousness. Animal studies have reported effects on the liver, kidney, and central nervous system (CNS) from acute inhalation exposure to high levels of tetrachloroethylene. Acute animal tests in mice have shown tetrachloroethylene to have low toxicity from inhalation and oral exposure.

Chronic Effects

The major effects from chronic inhalation exposure to tetrachloroethylene in humans are neurological effects, including sensory symptoms such

Bulletin Board

Hazard Alert

AUG. 20, 2021

as headaches, impairments in cognitive and motor neurobehavioral functioning and colour vision decrements. Other effects noted in humans, generally at higher exposures, include liver damage, kidney effects, immune and hematologic effects, and on development and reproduction. Animal studies have reported effects on the liver, kidney, and CNS from chronic inhalation exposure to tetrachloroethylene. EPA has calculated a Reference Concentration (RfC) of 0.04 milligrams per cubic metre (0.04 mg/m³) based on neurotoxicity in occupationally exposed adults. The Reference Dose (RfD) for tetrachloroethylene is 0.006 milligrams per kilogram body weight per day (mg/kg/d) based on neurotoxicity in occupationally exposed adults.

Reproductive/Developmental Effects

Some adverse reproductive effects, such as menstrual disorders, altered sperm structure, and reduced fertility, have been reported in studies of workers occupationally exposed to tetrachloroethylene. However, the evidence is inconclusive. Some studies of residents exposed to drinking water contaminated with tetrachloroethylene and other solvents during pregnancy suggest an association of tetrachloroethylene exposure with birth defects, however firm conclusions cannot be drawn due to several limitations of these studies. Increased foetal resorptions and effects to the foetus have been reported in animals exposed to high levels of tetrachloroethylene by inhalation.

Cancer Risk

Studies of dry cleaning workers exposed to tetrachloroethylene have shown associations between exposure to tetrachloroethylene and several types of cancer, specifically bladder cancer, non-Hodgkin lymphoma and multiple myeloma. There is also limited evidence suggestive of associations with oesophageal, kidney, cervical and breast cancer. Animal studies have reported an increased incidence of liver tumours in mice, from inhalation and gavage (experimentally placing the chemical in the stomach) exposure, and kidney and mononuclear cell leukaemias in rats, via inhalation exposure. EPA has classified tetrachloroethylene as likely to be carcinogenic to humans by all routes of exposure based on suggestive evidence in epidemiological studies and conclusive evidence in rats (mononuclear cell leukaemia) and mice (increased incidence of liver tumours). The International Agency for Research on Cancer (IARC) has classified tetrachloroethylene as probably carcinogenic to humans (Group 2A).

Bulletin Board

Hazard Alert

AUG. 20, 2021

SAFETY [6]

First Aid Measures

- Eye Contact: Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.
- Skin Contact: In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.
- Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.
- Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.
- Serious Inhalation: Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.
- Ingestion: Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Exposure Controls & Personal Protection

Engineering Controls

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapours below their respective threshold limit value.

Personal Protective Equipment

The following personal protective equipment is recommended when handling tetrachloroethylene:

- Safety glasses
- Lab coat
- Vapour respirator (be sure to use an approved/certified respirator or equivalent)

Bulletin Board

Hazard Alert

AUG. 20, 2021

- Gloves.

Personal Protection in Case of a Large Spill:

- Splash goggles
- Full suit
- Vapour respirator
- Boots
- Gloves
- A self-contained breathing apparatus should be used to avoid inhalation of the product.
- Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

REGULATION

United States [3]

EPA: The U.S EPA has set a maximum contaminant level for the amount of tetrachloroethylene that can be in drinking water at 0.005 milligrams tetrachloroethylene per litre of water (0.005 mg/L).

OSHA: The U.S Occupational Safety and Health Administration has set a limit of 100 ppm for an 8-hour workday over a 40-hour workweek.

NIOSH: The National Institute for Occupational Safety and Health recommends that tetrachloroethylene be handled as a potential carcinogen and recommends that levels in workplace air should be as low as possible.

Australia [2]

Safe Work Australia: Safe Work Australia has established a time weighted average (TWA) concentration for tetrachloroethylene of 50 parts per million over an eight hour workshift, with concentrations not greater than 150 parts per million.

Australian Drinking Water Guidelines (NHMRC and ARMCANZ, 1996): Maximum of 0.05 mg/L (i.e. 0.00005 g/L)

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1. <http://www.who.int/ipcs/publications/cicad/cicad68.pdf>
2. <http://www.npi.gov.au/resource/tetrachloroethylene>

Bulletin Board

Hazard Alert

AUG. 20, 2021

3. <http://www.atsdr.cdc.gov/toxfaqs/tf.asp?id=264&tid=48>
4. <http://www.cdc.gov/niosh/npg/npgd0599.html>
5. <http://www.epa.gov/ttn/atw/hlthef/tet-ethy.html>
6. <http://www.sciencelab.com/msds.php?msdsId=9927293>

Bulletin Board

Gossip

AUG. 20, 2021

Cuttlefish remember details of their last meal, study finds

2021-08-18

Cuttlefish have one of the largest brains among invertebrates and can remember what, where, and when specific things happened right up to their final days of life, according to new research.

The cephalopods – which have three hearts, eight arms, blue-green blood, regenerating limbs, and the ability to camouflage and exert self-control – only live for roughly two years.

As they get older, they show signs of declining muscle function and appetite, but it appears that no matter their age they can remember what they ate, where and when, and use this to guide their future feeding decisions, said the lead study author, Dr Alexandra Schnell from the University of Cambridge.

This is in contrast to humans, who gradually lose the ability to remember experiences that occurred at a particular time and place with age – for instance, what you ate for lunch last Wednesday. This “episodic memory” and its deterioration is linked to the hippocampus, a seahorse-shaped organ in the part of the brain near our ears. Cuttlefish, meanwhile, do not have a hippocampus, but a “vertical lobe” associated with learning and memory.

In the study, Schnell and her colleagues conducted memory tests in 24 cuttlefish. Half were 10-12 months old (not quite adults) while the rest were 22-24 months old (the equivalent of a human in their 90s), according to the paper, published in the journal *Proceedings of the Royal Society B*.

In one experiment, both groups of cuttlefish were first trained to approach a specific location in their tank, marked with a flag, and learn that two different foods would be provided at different times. At one spot, the flag was waved and the less-preferred king prawn was provided every hour. Grass shrimp, which they like more, was provided at a different spot where another flag was waved – but only every three hours. This was done for about four weeks, until they learned that waiting for longer meant that they could get their preferred food.

To make sure they hadn’t just learned a pattern, in the testing phase the flags were placed in random locations to denote the preferred food and the not so-preferred food. That information was then meant to be used to

This “episodic memory” and its deterioration is linked to the hippocampus, a seahorse-shaped organ in the part of the brain near our ears.

Bulletin Board

Gossip

AUG. 20, 2021

work out which feeding spot was best at each subsequent flag-waving, whether one or three hours later.

The placement of the flags was unique to each test day – so, the cuttlefish would have to recall what they ate during the initial feed, where they ate it, and how much time had passed, explained Schnell.

During training, the performance of both groups was comparable, she said. “In the test phase, the older cuttlefish actually outperforms the younger cuttlefish.”

Malcolm Kennedy, professor of natural history at the University of Glasgow, said it was refreshing to come across another case where aspects of animal cognition can be as advanced as our own, despite huge evolutionary time separation and a nervous system constructed completely different from ours.

“The pedestal upon which humans place themselves in terms of neurological abilities continues to crumble. It is just that other types of animals perform similar functions differently,” he said.

Schnell suggested that the preservation of episodic memory in cuttlefish despite their age may be related to the fact that they only breed at the end of their life, and remembering who they mated with, where, and how long ago could help disseminate their genes widely by allowing them to mate with as many partners as possible.

[theguardian.com](https://www.theguardian.com), 18 August 2021

<https://www.theguardian.com>

Shape-shifting fish that confounded scientists for 100 years spotted off California coast

2021-08-12

Scientists piloting a remote submarine have caught a rare glimpse of one of the deep sea's most mysterious and elusive creatures.

The bright orange, female whalefish (of the order Cetomimiformes) was spotted half-swimming, half-gliding through the glare of submarine's lights around 6,600 feet (2,013 meters) deep offshore of Monterey Bay, California. The whalefish sighting was one of only 18 made by marine biologists from The Monterey Bay Aquarium Research Institute during 34 years of deep-sea exploration.

Bulletin Board

Gossip

AUG. 20, 2021

“Whalefish have rarely been seen alive in the deep, so many mysteries remain regarding these remarkable fish,” the Monterey Bay Aquarium Research Institute tweeted. “With each deep-sea dive, we uncover more mysteries and solve others.”

So little is known about the lives of whalefish that for more than a century after their discovery (they were first recorded in 1895 by two Smithsonian Institution scientists), the three vastly different forms the animals may take across their life cycles were mistaken for entirely different zoological families.

First, there are the tapetails: scaleless larval forms with long, streamer-like tails and mouths that seem to have a comical overbite; they live and feed near the ocean's surface. When the time comes for these fish to assume their adult forms, two vastly different body shapes await them.

If they are male, the tapetails become bignoses: Scales sprout across their body, their mouths shrink to miniscule proportions as their jawbones waste away and their noses balloon outward. As they'll never feed again, their intestines, esophagus and stomach all shrivel and disappear. Their chest cavity is instead filled by their sexual organs and a gigantic liver as an energy store. The moments before the male tapetail's metamorphosis could be described as a feeding frenzy: The creatures will stuff themselves with tiny crustaceans called copepods to help power them through the remainder of their lives as mobile sperm-delivery systems.

Females undergo a no less dramatic transformation. Their bodies expand to resemble a miniature baleen whale, growing to sizes far greater than their male counterparts, and they develop water pressure-detecting lateral lines along their flanks to guide them through the pitch-black depths. In some species, the females' bodies change to a shade of brilliant orange; as red and orange colors of light cannot penetrate the depths they live in, this coloring makes the fish virtually invisible.

Both males (bignose fish) and females (whalefish) tend to be spotted at depths between 4,920 and 6,560 feet (1,500 to 2,000 meters) beneath the ocean's surface, although some reports have claimed that they can go far deeper still to depths beyond 11,500 feet (3,500 meters) .

The bizarre transforming acts Cetomimiformes perform are unprecedented among vertebrates, for decades no one knew that the different body types belonged to the same zoological family. It was only in 2009 that a study of mitochondrial genes, or genes that trace the maternal line, (alongside careful analyses of the animal specimens collected mid-

Bulletin Board

Gossip

AUG. 20, 2021

transformation) enabled researchers to conclusively prove that the tapetails, bignoses and whalefish in their study belonged to the same species.

However, this discovery was made in just one species, and the elusiveness of the deep-ocean dwelling animal means that the family trees for many whalefish species may never be completed.

Little is known of the fish's habits either, but scientists think whalefish migrate up to around 2,000 feet (600 m) beneath the sea surface to feed by starlight, retreating to the safety of the depths as day breaks.

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[livescience.com](https://www.livescience.com), 12 August 2021

<https://www.livescience.com>

A well-known wildflower turns out to be a secret carnivore

2021-08-18

Gleaming, gluey, deathtrap hairs have betrayed the secret identity of a well-known wildflower: It's a carnivore.

A species of false asphodel (*Triantha occidentalis*) uses enzyme-secreting hairs on its flowering stem to snare and digest insects, researchers report in the Aug. 17 Proceedings of the National Academy of Sciences. Scientists have known about *T. occidentalis* since the 19th century, but its taste for meat has gone undetected until now.

Sticky hairs by themselves aren't unusual — many noncarnivorous plants use them to defend against pests. But *T. occidentalis* has qualities that some meat-eating plants share: a love of bright, boggy, nutrient-poor habitats and the absence of a gene that fine-tunes how plants get energy from light. Together, those features felt like pieces of a jigsaw puzzle hinting at carnivory, says botanist Sean Graham of the University of British Columbia in Vancouver.

To solve the puzzle, Graham and colleagues needed to know if the wildflower pulls nutrients from insect corpses. Luckily, *T. occidentalis* grows along North America's West Coast, from Alaska to California, and can be found on hikes near Vancouver. "They're right on our doorstep," Graham says.

Scientists have known about *T. occidentalis* since the 19th century, but its taste for meat has gone undetected until now.

Bulletin Board

Gossip

AUG. 20, 2021

The team attached fruit flies fed with nitrogen-15, an isotope that can be used to track changes in nitrogen levels, to the flowering stems of bog-dwelling *T. occidentalis* plants in British Columbia's Cypress Provincial Park. Over half of the wildflowers' nitrogen came from the fruit flies, the team found. Those levels are comparable to known carnivorous plants. What's more, the wildflowers' sticky hairs oozed phosphatase, a digestive enzyme that many carnivorous plants secrete to consume prey.

Most of the world's roughly 800 meat-eating plant species set traps and flowers far apart to avoid killing pollinating visitors (SN: 2/6/18). *T. occidentalis* bucks that trend. "Putting your traps close to your flowers is, on the surface, a really big conflict," Graham says. But the plant's hairs may be just sticky enough to catch small flies and beetles without entrapping bigger pollinators such as bees and butterflies.

T. occidentalis' sticky hairs might also hint at how some meat-eating plants evolved. In nutrient-poor soils, it may have been advantageous for some plants to co-opt hairs for carnivory, Graham says. "The insects are being trapped anyway, so might as well use them."

[sciencenews.org](https://www.sciencenews.org), 18 August 2021

<https://www.sciencenews.org>

Highest recorded temperature in European history reported in Italy

2021-08-13

Italy may have just recorded the hottest temperature in European history, according to preliminary reports from local meteorologists. And perhaps fittingly, the culprit of the heat wave has been named Lucifer.

Syracuse, a city on the coast of the Italian island of Sicily, registered temperatures of 119.85 degrees Fahrenheit (48.8 degrees Celsius) on Wednesday (Aug. 11). If the measurement is confirmed by the World Meteorological Organization, it will break the previous European record of 118.4 F (48 C) recorded in Athens in 1977.

The measurement comes amid a scorching heat wave that has baked the Mediterranean for more than a week, feeding devastating wildfires that have destroyed homes and claimed lives in Italy, Greece, Algeria and Turkey, according to the Associated Press.

Syracuse Mayor Francesco Italia told the newspaper *La Repubblica* that the potential temperature record "worries us." "We are devastated by the fires.

Syracuse, a city on the coast of the Italian island of Sicily, registered temperatures of 119.85 degrees Fahrenheit (48.8 degrees Celsius) on Wednesday (Aug. 11).

Bulletin Board

Gossip

AUG. 20, 2021

And our ecosystem — one of the richest and most precious in Europe — is at risk," Italia said. "We are in full emergency."

Firefighters have dealt with 44,442 wildfires since June 15, according to Italian government statistics — a major increase on the 26,158 reported over all of last summer. Italy's fire and rescue service wrote on Twitter that its firefighters had battled with more than 500 blazes in Sicily and Calabria on Wednesday night to Thursday morning (Aug. 12) alone, using five planes to douse the flames from above.

Four deaths have been associated with the fires in the past week in southern Italy, including a 77-year-old shepherd who was found dead in the Calabria region (the toe of Italy's "boot"). The man was reportedly seeking refuge in a farmhouse with his flock when he died, according to the Associated Press.

"Yet another victim of the fires. We are losing our history, our identity is turning to ashes, our soul is burning," Giuseppe Falcomatà, the mayor of the Calabrian province Reggio Calabria, wrote on Facebook in response to the news.

According to meteorologists, the heat wave in southern Italy is caused by an anticyclone — a region of high pressure that causes the air trapped within it to sink — which formed over North Africa. The anticyclone has been nicknamed Lucifer by Italian media.

Lucifer is projected to continue moving northward across Italy, creating blistering conditions as it advances toward Rome.

Wildfires have ripped through other parts of southern Europe and North Africa this week, destroying many villages in Greece and forcing thousands to evacuate. Algeria's president declared a three-day mourning period yesterday (Aug. 11) after the death toll from forest fires climbed to 65. In Turkey, a forest fire that approached a coal-fired power plant on the southwest coast also prompted an evacuation, Live Science previously reported.

On Monday (Aug. 9), a landmark report from the U.N.'s Intergovernmental Panel on Climate Change (IPCC) issued a stark warning that Earth was expected to reach the critical threshold of 1.5 C (2.7 F) warming due to climate change within the next 20 years.

The report, which U.N. Secretary-General António Guterres described as a "code red for humanity," warns that increasingly extreme heat waves, droughts and floods will become more common as the planet warms.

Bulletin Board

Gossip

AUG. 20, 2021

"The alarm bells are deafening, and the evidence is irrefutable: Greenhouse gas emissions from fossil fuel burning and deforestation are choking our planet and putting billions of people at immediate risk," Guterres said in a statement. "If we combine forces now, we can avert climate catastrophe. But ... there is no time for delay and no room for excuses."

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<https://www.livescience.com>

3 men die in a manure pit: Here's why it's a 'death trap.'

2021-08-13

Three men in Ohio died this week after entering a manure pit and passing out from the fumes, according to news reports.

The men, who were brothers, had entered the manure pit to fix a pump, according to local news outlet KDKA. They were knocked unconscious by the fumes and became trapped in the pit, where first responders found them on Tuesday (Aug. 10), KDKA reported. The men were rescued and taken to local hospitals. All three men died at the hospital that same day, according to Insider.

Manure pits, which are used to store animal waste for use as fertilizer, produce toxic gases that can be deadly. Decomposing manure produces hydrogen sulfide, methane, ammonia and carbon dioxide, all of which can be hazardous to humans and animals at high concentrations, according to the National Agricultural Safety Database (NASD).

The most dangerous of these gases is hydrogen sulfide. At low levels, the gas gives off an odor of rotten eggs, and causes eye and throat irritation, according to NASD. At moderate levels, exposure causes headache, nausea and dizziness. As concentrations of the gas increase, it paralyzes nerve cells inside the nose, and causes a loss of smell, NASD says. This means a person can't rely on their nose to detect dangerously high levels of hydrogen sulfide.

When the manure in the pit is agitated or pumped for use, levels of hydrogen sulfide can quickly rise from 5 parts per million (ppm) to more than 500 ppm, a level that can lead to unconsciousness. Breathing hydrogen sulfide at levels above 600 ppm can cause death in just one or two breaths, according to NASD.

They were knocked unconscious by the fumes and became trapped in the pit, where first responders found them on Tuesday (Aug. 10), KDKA reported.

Bulletin Board

Gossip

AUG. 20, 2021

Exposure to the ammonia in manure pits can cause eye and throat irritation, wheezing and shortness of breath.

In addition, both methane and carbon dioxide are dangerous because they can displace oxygen inside an enclosed space, leading to asphyxiation.

People who enter manure pits should take necessary safety precautions. Such precautions include testing gas levels with a meter before entering, or wearing a self-contained breathing apparatus (SCBA) and a safety harness. It's also important for people who attempt to rescue those trapped in a manure pit to wear protective equipment, according to NASD.

"Unless the rescuer is wearing SCBA protective equipment ... there is a strong likelihood that the rescuer will also succumb to the toxic gases or lack of oxygen. There have been numerous instances where several farmers have been killed while attempting to remove someone from a pit or facility," according to the NASD.

"Always treat a [manure] pit as if it is a death trap," the website says.

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<https://www.livescience.com>

Hundreds of UK and EU cosmetics products contain ingredients tested on animals

2021-08-19

Hundreds of cosmetic products sold in the UK and Europe contain ingredients that have been tested on animals, despite bans that outlawed such testing years ago, a new analysis has shown.

Banned tests were performed on ingredients used in products including moisturisers, lipsticks, sunscreen and hair conditioner, the analysis found, with more than 100 separate experiments performed on animals including mice and rabbits.

"European customers can't assume the products they buy are not tested on animals," said Thomas Hartung, an expert in alternatives to animal testing at Johns Hopkins University and one of the authors of the analysis. Even products labelled as not tested on animals may contain some ingredients that are tested on animals, he said.

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Bulletin Board

Gossip

AUG. 20, 2021

At the heart of the issue are two sets of competing legislation. The EU ban on animal testing of cosmetic ingredients came into force in 2009. But another law regulating chemicals was introduced in 2007, placing the burden of proof on companies to identify and manage the risks linked to chemicals they manufacture and market in the EU to ensure worker safety.

This can include chemicals being manufactured exclusively for use in cosmetics, eclipsing the animal testing ban for cosmetic ingredients, according to the European Chemicals Agency (ECHA),

There has always been uncertainty about whether the chemicals legislation, the cosmetics legislation – or, indeed, the EU directive on animal protection, which says there should be no animal testing unless absolutely necessary – should be complied with, said Dr Julia Fentem, head of the safety and environmental assurance centre at the consumer goods group Unilever. "And that's the difficulty companies find themselves in."

This discrepancy has led some chemical companies to perform the banned animal tests on cosmetic ingredients, the analysis found. The researchers, who include a toxicologist from the German chemicals company Clariant, said that animal tests were carried out on cosmetics-only ingredients just to satisfy the chemicals legislation.

The researchers behind the analysis looked at hundreds of documents detailing chemical safety tests, which are publicly available on the ECHA website. They found that of 413 ingredients used exclusively in cosmetics, 63 were tested after the ban in the EU came into force. The post-ban ingredients were subject to 104 new animal tests, according to the paper published in the journal *Alternatives to Animal Experimentation*.

An ECHA spokesperson said the number of animal tests conducted as a result of chemicals legislation was likely to be lower but acknowledged that the agency has not ratified the research findings. To ensure worker safety, chemicals regulations require safety data, the spokesperson said. "Animal testing may be required – but only if no alternative tests are available."

The agency does accept proposals to use alternatives to animal testing but a "very high percentage" of proposals do not give a "sufficient science-based justification" for their use, the spokesperson added.

In a recent high-profile case involving the German chemicals firm Symrise, ECHA ruled the company must carry out animal tests on two ingredients

Bulletin Board

Gossip

AUG. 20, 2021

used solely in cosmetics to satisfy chemicals regulations, despite stiff opposition by Symrise that proposed using alternative methods. The company has since challenged the ruling at the European court of justice on scientific grounds.

The chemicals law “is being used to force companies, despite strenuous objections and even legal challenges, to commission questionable new animal testing as part of a bureaucratic box-ticking exercise,” said Troy Seidle, vice-president of research and toxicology at Humane Society International.

Peta’s science policy manager Dr Julia Baines said: “Shamefully, the animal tests requested for these two ingredients are just the tip of the iceberg.”

More animal testing of cosmetics-only ingredients is imminent, the researchers behind the analysis warned. “ECHA has already asked for new animal tests ... involving thousands of animals and undermining the public’s confidence in the way the EU is upholding its animal testing bans,” said Dr Katy Taylor, director of science and regulatory affairs at the charity Cruelty Free International.

Scientists and campaigners have stressed that animal testing is no longer scientifically necessary to ensure cosmetic ingredient safety. “Lessons learned in animal-free safety assessment of cosmetics over many years can be readily applied to occupational safety assessment of ingredients without compromising human safety,” a spokesperson for the Animal-Free Safety Assessment Collaboration said.

Fentem said the European Commission should immediately suspend any further animal testing of cosmetics ingredients and re-evaluate what ECHA is asking companies to do. “The commission needs to be able to demonstrate to EU citizens how killing hundreds of thousands more animals to test cosmetic ingredients actually affords any better protection of workers and our environment, bringing forward evidence to show why modern non-animal safety science could not be used instead.”

[theguardian.com](https://www.theguardian.com), 19 August 2021

<https://www.theguardian.com>

Bulletin Board

Gossip

AUG. 20, 2021

US to recommend COVID-19 vaccine booster shots 8 months post-vaccination

2021-08-18

Health officials will likely recommend that people in the U.S. receive a COVID-19 booster shot eight months after their second dose, to boost protection against the highly-transmissible delta variant, according to recent news reports.

Before third doses can be administered, the Food and Drug Administration (FDA) will need to authorize them, according to The New York Times. The first booster doses would likely be given to those who were among the first vaccinated last winter, including nursing home residents, health care workers and emergency workers, likely followed by older people and then the general public, according to the Times.

The boosters will be recommended for those who were fully vaccinated with the Pfizer or Moderna shots; health officials are waiting for more data before advising people who received the Johnson & Johnson single-dose vaccine, according to CBS News.

In any case, before third doses can be administered, the Food and Drug Administration (FDA) will need to authorize the boosters, according to The Association Press.

Last week, the FDA approved booster shots for those with weakened immune systems, the FDA said in a statement. Studies have found that people who are immunocompromised, about 2.7% of the adult population in the U.S., do not mount as strong of a response against SARS-CoV-2 as healthy controls, Live Science previously reported.

But what about people who don’t have weakened immune systems? Data suggests that COVID-19 vaccines used in the U.S. do protect most people from severe disease and illness caused by the delta variant, Live Science previously reported. But some data from Israel suggests that the effectiveness of the Pfizer-BioNTech vaccine is declining in the face of the delta variant, according to the Times.

“There is a concern that the vaccine may start to wane in its effectiveness over months,” Dr. Francis Collins, the director of the National Institutes of Health told Fox News Sunday. “And delta is a nasty one for us to try to deal with. The combination of those two means we may need boosters.”

COVID-19 cases in the U.S., driven by the highly-transmissible delta variant, have been rising dramatically, especially in states with lower vaccination

The boosters will be recommended for those who were fully vaccinated with the Pfizer or Moderna shots[.]

Bulletin Board

Gossip

AUG. 20, 2021

rates. Hospitalizations have also been steeply rising, but the vast majority of people who are hospitalized are unvaccinated.

On Aug 4, the World Health Organization called for a halt in booster shots at least until the end of September, to allow for enough doses for initial vaccination in poorer countries, according to Reuters.

But some countries have already begun giving booster shots to segments of their population. Turkey has already given more than 6.8 million booster shots, according to Hurriyet Daily News. Israel is offering booster shots to people over age 50, and Germany and France are planning to offer booster shots to vulnerable populations next month, according to the Times.

In the U.S., health officials say people will likely receive a booster of the same vaccine that they originally received, according to the Times.

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<https://www.livescience.com>

Pi calculated to a record-breaking 62.8 trillion digits

2021-08-18

Researchers in Switzerland are set to break the record for the most precise value of the mathematical constant pi, after using a supercomputer to calculate the famous number to its first 62.8 trillion decimal places.

Pi is the ratio of a circle's circumference to its diameter. The name "pi" comes from the 16th letter in the Greek alphabet and has been used by mathematicians to represent the constant since the early 18th century. The first 10 digits of pi are 3.141592653, but the constant is what is known as an irrational number, meaning that it cannot be expressed as a common fraction and has an infinite number of decimal places.

On Aug. 5, researchers from the University of Applied Sciences of the Grisons in Switzerland announced that they had broken the record for the most accurate value of pi by more than 12 trillion decimal places, using a computer at the Competence Center for Data Analysis, Visualization and Simulation (DAViS). The record attempt has yet to be officially confirmed by Guinness World Records.

"Breaking the record is just a side effect of our work in preparing our high performance computer infrastructure for work in research and

Bulletin Board

Gossip

AUG. 20, 2021

development," lead researcher Thomas Keller, a computer scientist at the University of Applied Sciences of the Grisons, told Live Science.

Knowing more digits of pi isn't particularly important for mathematics.

But calculating the value of pi to high precision has long been used as a benchmark to test the processing power of computers. In 2019, a Google cloud computing system calculated the constant's value to more than 31 trillion decimal places, and in 2020, Timothy Mullican of Huntsville, Alabama, founder of a nonprofit called North Alabama Charitable Computing, calculated 50 trillion decimal places, using his personal computer, according to Guinness World Records.

The DAViS team not only broke Mullican's record but also did so in roughly a third of the time — taking just 108 days and 9 hours, compared with Mullican's 303 days — even though they used the same algorithm to run the calculations.

The DAViS computer outperformed the previous record holders thanks to a boost in random access memory (RAM), Keller said.

"Calculating to 62.8 trillion decimal places requires around 316 terabytes of RAM [around 324,500 gigabytes]," Keller said. "Such a machine cannot be bought, to our knowledge, and if one could, it would be extremely expensive."

So the computers used hard disks to beef up the RAM, Keller said.

The researchers plan to use the computer that performed the calculations to conduct computational fluid dynamics, deep learning and RNA analysis in the future, Keller said.

The team has no plans to calculate more of pi's decimal places and is confident that before long, someone will snatch the record away, Keller said. "Looking at the previous pace of record setting, I anticipate the next successful record-breaking attempt any time in the space of the next two years."

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<https://www.livescience.com>

The Environmental Protection Agency (EPA) said the decision to end the use of chlorpyrifos would protect children and farm workers from health problems.

Bulletin Board

Gossip

AUG. 20, 2021

Chlorpyrifos pesticide to be banned in the US, Environmental Protection Agency says

2021-08-19

A pesticide linked to health problems in children will be banned from use on food crops in the US.

Key points:

- The EPA said the decision to ban chlorpyrifos would protect children and farm workers
- Chlorpyrifos was banned in 2015 under President Barack Obama
- President Donald Trump's EPA reversed the decision, describing a lack of evidence

The Environmental Protection Agency (EPA) said the decision to end the use of chlorpyrifos would protect children and farm workers from health problems.

The decision is a victory for environmental activists who have fought to stop the use of the chemical, which is widely used in American agriculture.

Its use was banned in Australia last year.

Chlorpyrifos has been used as a pesticide since 1965 on farms and in non-agricultural areas such as golf courses, according to the EPA.

Domestic use was banned in the US in 2001.

Agricultural use was first banned in 2015, under president Barack Obama, after the EPA said it could not be certain whether exposure in food and water would be harmful.

But Donald Trump's EPA later reversed the decision, saying there was not enough evidence to link exposure to children's health issues.

"EPA is finally following its own findings on this poisonous pesticide," said Allison Johnson, an attorney for the Natural Resources Defense Council.

Chlorpyrifos products were banned in California last year.

Bulletin Board

Gossip

AUG. 20, 2021

The pesticide's maker, Corteva, stopped making it last year because of declining sales.

abc.net.au, 19 August 2021

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

COVID-19 could mix up body's 'fight-or-flight' system

2021-08-16

COVID-19 may mess with the body's fight-or-flight response, a small new study suggests.

The coronavirus can infect many different organs in the body, including the brain. Previous studies have found that in rare cases, SARS-CoV-2 infections can lead to a variety of forms of brain damage including deadly inflammation, Live Science previously reported. In some cases, the virus has also been linked to "brain fog" and other psychiatric issues in patients, according to another Live Science report.

But there's still much that's unknown about the subtle impacts a typical COVID-19 infection may have on the nervous system. In the new study, researchers recruited a small group of young adults in the U.S. who were recovering or had recovered from COVID-19, to examine whether the coronavirus triggers changes in the sympathetic nervous system.

The sympathetic nervous system — which regulates involuntary body functions such as blood pressure, pupil dilation and body temperature — drives the body's fight-or-flight response. In the face of danger, such as an approaching wild animal, the sympathetic nervous system will trigger the release of hormones to increase alertness and heart rate, which sends extra blood to the muscles, according to Live Science.

"'Fight-or-flight' is a great mechanism in situations of high stress," such as when a bear is chasing you, said study senior author Abigail Stickford, an assistant professor of health and exercise science at the Appalachian State University in North Carolina. "But when that system is chronically elevated or stimulated, it's not so great."

Stickford and her team recruited 16 previously healthy young adults who had tested positive for SARS-CoV-2 more than two weeks prior to visiting the lab and had mild cases. The researchers recorded nerve activity using electrodes, blood pressure and heart rate while the participants were resting and while the participants were sticking their hand into an ice

Bulletin Board

Gossip

AUG. 20, 2021

water bath — a heart test known as a “cold pressor test.” They compared their results to healthy young adult controls who weren’t infected.

The researchers found that young adults recovering from SARS-CoV-2 infections had elevated sympathetic activity while resting compared to healthy controls. But they had no difference in heart rate, blood pressure and sympathetic nerve activity during the cold pressor test. That means that their fight-or-flight response was more active when it didn’t have to be during rest, but the system was still able to respond properly to a threat.

They also found that when the participants were asked to perform an “orthostatic challenge,” or quickly stand from a sitting or lying down position, the participants recovering from SARS-CoV-2 infections had higher sympathetic nerve activity and a greater increase in heart rate compared to healthy controls.

Many experts speculate that COVID-19 impacts the sympathetic nervous system, based on heart rate data from those infected and reports of symptoms including racing heartbeat and cognitive changes, so the results weren’t “entirely surprising,” Stickford told Live Science in an email. “However, these participants were very young, healthy, and with mild symptoms, so in that regard, it was surprising.”

The authors say that if the results hold true in older individuals who get COVID-19, “there may be substantial adverse implications for cardiovascular health.”

Just SARS-CoV-2 or all viruses?

No one knows why or how the virus triggers changes in the sympathetic nervous system, but the virus triggers inflammation, which in turn is linked to elevated sympathetic nervous system activity, Stickford said.

Still, that doesn’t mean that other viruses aren’t causing these changes as well.

Dr. Igor Vaz, from the University of Miami’s Department of Medicine, who was not involved in the research, thinks that the results would have been more robust if the control group hadn’t been healthy individuals but individuals recovering from a different viral infection, such as the flu. “Using the control group as healthy individuals misses the opportunity to show that” these complications are due exclusively to SARS-CoV-2, and not just because people are recovering from a viral infection, he wrote in a “letter to the editor,” which was published in response to the study.

Bulletin Board

Gossip

AUG. 20, 2021

In a response to the letter, the authors acknowledged that comparisons with other infections would have given more insight into the exact impact of SARS-CoV-2 on the nervous system, but that their “study design was the most appropriate starting place,” given various limitations such as access to patient populations.

The biggest limitation of the study is that the researchers don’t know what the participants’ nervous system activity looked like prior to their COVID-19 diagnosis, Stickford said. But it’s likely that the changes to the fight-or-flight response in this young, healthy population is temporary, Stickford added. As viral load decreases, inflammation in the body decreases, and “we would expect the [sympathetic nervous system] activity to also decline a bit,” she said.

The researchers are continuing to track these participants, none of whom developed “long COVID,” a phenomenon whereby symptoms continue for months after a person is infected.

Had these participants developed long COVID, “there would likely be more to the story,” as people who suffer from long COVID continue to display symptoms that suggest a dysfunction of the nervous system.

The findings were published on June 26 in The Journal of Physiology.

Originally published on Live Science.

[livescience.com](https://www.livescience.com), 16 August 2021

<https://www.livescience.com>

Bulletin Board

Curiosities

AUG. 20, 2021

Colds and other common respiratory diseases might surge as kids return to school

2021-08-12

As U.S. schools resume in-person learning this fall, parents and administrators may have to deal with more outbreaks of colds and other seasonal respiratory illnesses than usual. If so, these outbreaks aren't likely to be especially dangerous for school-age children, but could be problematic for traditionally more vulnerable younger siblings or elderly relatives, experts say. And because the symptoms of these illnesses often mirror those of COVID-19, it could make having kids back in the classroom — and keeping them there — that much more challenging.

Respiratory viruses, which cause common colds and the flu, typically circulate in colder months. But last year's cold-and-flu season was practically nonexistent. Some cold-causing viruses, such as rhinoviruses and enteroviruses, kept spreading, though at reduced levels. Influenza and respiratory syncytial virus, or RSV, however, were held to historically low levels, an unintended effect of COVID-19 pandemic precautions such as border closings, wearing masks and social distancing (SN: 2/2/21). Other respiratory pathogens that cause cold-like symptoms, such as adenoviruses and parainfluenza viruses, also had very mild seasons last winter, researchers with the U.S. Centers for Disease Control and Prevention report July 23 in *Morbidity and Mortality Weekly Report*.

"There's been a huge, huge change during the COVID pandemic in the circulation of what we think of as the commonplace respiratory viruses and the seasonal respiratory viruses," says Ellen Foxman, an immunologist at Yale School of Medicine. RSV and flu "have virtually disappeared during the COVID pandemic, almost certainly because of the mitigation measures."

COVID-19: Back to school

This story is one in a series looking at what to expect as U.S. children return to in-person school.

But, worryingly, that absence has created a larger-than-usual population of people vulnerable to these common respiratory viruses. When people don't get sick with the viruses for a year or two, immunity to them wanes. That makes those people, including school-age kids, more likely to get sick in the coming months.

Bulletin Board

Curiosities

AUG. 20, 2021

Keeping COVID-19 precautions such as wearing masks in place could help keep these other respiratory viruses from surging. Without those precautions this coming winter, experts think high rates of RSV and other common respiratory viruses are probable.

A string of endless colds would be annoying and possibly disruptive to schooling, given that these viruses often cause symptoms like runny noses and cough, similar to some COVID-19 symptoms. That means kids might have to miss school while waiting for COVID-19 test results. What's more, these kids can pass these infections on to very young or elderly family members.

"The kids are going to go to school, they'll bring it home to the family and the younger children," says Ian Barr, a virologist at the World Health Organization's Collaborating Centre for Reference and Research on Influenza at the Doherty Institute in Melbourne, Australia. Those family members "are the ones who will ... end up with the symptomatic and in some cases, serious infections."

Influenza and RSV are the most serious seasonal respiratory viruses, especially for the very young and the elderly. The CDC estimates that RSV typically puts about 58,000 children under age 5 in the hospital each year and is the most common cause of pneumonia in children under a year old. It also hospitalizes more than 177,000 adults 65 and older. Influenza viruses typically kill around 36,000 people a year in the United States and hospitalize almost half a million, the CDC estimates.

With the pandemic-induced lull in these diseases, there is now a larger population of people vulnerable to RSV and that has led to unusual, off-season outbreaks of the illness in some places, researchers report July 22 in *Eurosurveillance*. Multiple states in Australia saw off-season RSV peaks in summer months that were even larger than traditional winter peaks. In Western Australia, the normal cold-weather peak for RSV is a little over 40 detections per week in the middle of July. But in 2020, there was no cold-weather peak. RSV infections stayed low until the warm months, and then peaked at over 100 detections a week in December, researchers reported in February in *Clinical Infectious Diseases*.

In the United States, detections of RSV have been mostly rising since spring, according to the CDC's National Respiratory and Enteric Virus Surveillance System. In late March, there were about 100 detections a week in the surveillance system. In the week ending July 24, there were more than 3,100 weekly detections. That's still far below a normal RSV season; for example, cases peaked at 24,280 detections a week in

Bulletin Board

Curiosities

AUG. 20, 2021

December of 2019. But the timing is the thing, experts say. "It's rare for most of these respiratory diseases to be circulating in summer," says Barr, a coauthor of the Eurosurveillance study.

On the rise

Respiratory syncytial virus (RSV) is usually a winter virus that affects primarily young children and the elderly. It all but disappeared earlier during the pandemic. But the five-week moving average of RSV detections in the United States shows that cases of RSV have been rising as governments and businesses lift COVID-19 precautions. The most recent weeks' detections may increase as more data comes in.

Short and sharp summer outbreaks of RSV — like those seen in Western Australia in December of 2020 — seem to lead to a lower surge later, Barr says. But places where levels of RSV and other seasonal respiratory viruses stay low through the warm months, could turn into hot spots in the fall and winter with a larger-than-normal season.

There is one big exception to that prediction: If the coronavirus is widespread during winter, "it may still keep these other viruses low," says Richard Webby, a virologist at St. Jude Children's Research Hospital in Memphis, Tenn.

If so, that wouldn't just be because of COVID-19 precautions left in place to help control the coronavirus. At play would also be a phenomenon called viral interference — when one respiratory virus dampens the spread of other viruses (SN: 9/18/20). There are two ways that this can happen: by sickening people and having them stay home — removing them from the population than can be infected at a given school or workplace — or by directly priming infected individuals' immune system to fight off other viral infections.

"When one virus is there, there's a heightened state of general antiviral defenses" in the body, Foxman says. "So you would predict that for a certain ... period after somebody has one viral infection, they may be more resistant to getting another viral infection." Still, this scenario would mean relatively high levels of coronavirus cases in the country — not exactly something to hope for. See all our coverage of the coronavirus outbreak

"If [I] had to guess what was going to happen, [I'd say] that some of these other respiratory diseases are going to be more of a problem than influenza when your kids go back to school," Barr says. "The parainfluenzas,

Bulletin Board

Curiosities

AUG. 20, 2021

the adenoviruses, RSV — these sorts of viruses are more likely to circulate than influenza."

That's partly because the flu vaccine exists, which can help lessen influenza outbreaks. And it's partly because of the way that the flu spreads and evolves as it moves around the world, experts say, and how that spread seems to be more affected by border closures and reduced travel than other respiratory viruses. Less travel around the world in the last two years has prevented influenza epidemics from spreading out of countries to other places, and the flu remains at very low levels worldwide.

Ultimately, "it's a little hard to predict what's going to happen, because we have never had this kind of disruption before in the transmission of these viruses," Foxman says. "But of course, it's very interesting to follow it and important to see what happens, because we're going to learn a lot."

sciencenews.org, 12 August 2021

<https://www.sciencenews.org>

How artificial intelligence can help save us from air pollution

2021-08-12

As air quality plummets across the U.S. this summer, researchers have a glimmer of good news.

Artificial intelligence may soon provide advanced warning of future pollution events, which could help hospitals prepare for the uptick in pollution-related illnesses, or even reduce people's exposure entirely.

A spike in air pollution often leads to a spike in hospital admissions, as it can exacerbate asthma and other pre-existing respiratory conditions, cause upper respiratory tract infections, or increase the likelihood of stroke. But it's currently impossible to prepare for these spikes due to the constraints of existing air quality forecasts, which are only accurate up to three days in advance, Yunsoo Choi, associate professor of atmospheric chemistry from the University of Houston, told EHN.

In that short amount of time, one of the only things we can do to protect ourselves is to limit time spent outdoors.

But now, through the use of artificial intelligence (AI) technology, Choi and the University of Houston's Air Quality Forecasting and Modeling Lab

These models could give local governments more opportunities to control pollution emission sources.

Bulletin Board

Curiosities

AUG. 20, 2021

created a new model that can predict ozone pollution up to 14 days ahead of time.

While ozone in the upper atmosphere shields us from the sun's ultraviolet radiation, ozone at ground-level is a harmful pollutant that irritates our lungs. Since it is formed in the atmosphere on hot, sunny days, we will see unprecedented spikes in ozone due to climate change, similar to what we witnessed across the U.S. during the country's most recent heat wave.

These models could give local governments more opportunities to control pollution emission sources.

"Having a model that runs faster allows [local governments] to explore a greater variety of scenarios of how they can improve [air quality]," Sherri Hunt, the Principal Associate National Program Director for the Air, Climate and Energy Research Program at the Environmental Protection Agency (EPA), told EHN. Hunt was not involved in this study. For example, if researchers determine the future high ozone event will be caused by cars, then policymakers can suggest ways to minimize the number of cars on the road.

In addition, with Choi's AI model, "we could decide how we're going to staff the emergency room" during bad air events, Hunt said.

Artificial intelligence to improve air quality forecasting

Traditional air quality forecasts are created by numerical models, which are essentially sophisticated calculators. They solve many lines of mathematical equations to determine how much pollution will be produced, and how it will be transported across an area at a given point in time.

These equations aren't solved only once. They have to be solved for each hour the model forecasts into the future, which takes a lot of time and computational power.

"In order to forecast two or three days...that takes a few hours" even with a supercomputer, said Choi.

AI models predict ozone without these time-consuming calculations. Instead, researchers "train" the model by providing past air quality data, which the model uses to learn how ozone behaves under different sets of meteorological conditions.

Bulletin Board

Curiosities

AUG. 20, 2021

Based on the patterns observed, the model makes an educated guess of how much ozone might be present in the future. It only takes minutes and is more accurate than its predecessors.

The researchers demonstrated this by modeling ozone pollution in South Korea in 2017 after training the AI model on data collected up to three years prior. They then compared their results to the Community Multi-scale Air Quality Model (CMAQ), which is a commonly used numerical model developed by the EPA. Using CMAQ, the model's average accuracy peaked at 77% on day one of predictions and decreased rapidly over the following 14 days. When Choi used artificial intelligence, however, the average accuracy on the first day of predictions was 90%. While this value decreased trailed off over the two weeks, it still performed better than CMAQ did on day one.

Air pollution strain on hospitals

The highly accurate 14-day forecasts of Choi's AI model, combined with its faster computational time, could alleviate stress on our public health system. "We can see real increases in emergency department visits and other cardiovascular and respiratory impacts" following an air pollution event, said Hunt.

For example, one recent study that looked at Medicare patients concluded that exposure to ozone, among other pollutants, might contribute to thousands of additional hospital admissions each year.

Hospitals "have to show that there's a need if they're going to increase their number of beds or their number of providers in a particular area," explained Hunt.

Knowing how pollution levels could change two weeks in advance could help hospital administrators make their case more efficiently.

Climate change and ozone

There's also the matter of climate change, which can influence the amount of ozone produced in the atmosphere due to the uptick of hot, stagnant weather.

But it's hard to update the equations and parameters that numerical models use to calculate pollutant concentrations, said Choi, who has worked with these types of models in the past. "It's not easy to adjust to new types of [weather] phenomena" like heat waves.

Bulletin Board

Curiosities

AUG. 20, 2021

On the other hand, however, AI models are much more adaptable. They learn from their mistakes and adjust their predictions accordingly. They can also be retrained with new data to improve their forecasts.

AI technology has limitations. For one, researchers might see that the model is producing the right answer, but they “don’t know if the model is getting those things right for the right reasons,” said Hunt.

However, “by using [numerical modeling] we can know the all the details of what happened—what kind of chemical or physical properties are critical” in creating high pollution events, said Choi. A combination of both models will likely need to be used in the future.

It’s just going to take some time. “Within EPA, I don’t know anyone, any of our research scientists, who are using AI techniques,” said Hunt.

The agency is, however, funding academic researchers who are focused on improving AI models and integrating them with the technology that exists today.

“Once that work is done that can potentially be brought back to the agency,” said Hunt. “We want to use [models] to inform actions to make more people breathe clean air, so if we can make a better tool than that’s going to benefit us in a variety of different ways.”

[ehn.org](https://www.ehn.org), 12 August 2021

<https://www.ehn.org>

Here’s why you need to wash your hands for 20 seconds, according to physics

2021-08-18

Physicists have figured out the perfect method of hand washing to clear out particles of bacteria and viruses, including the novel coronavirus. They found that it takes about 20 seconds to dislodge viral or bacterial particles from our hands. That should sound familiar — it’s in line with what most public health experts recommend.

For the study, published Tuesday (Aug. 16) in the journal *Physics of Fluids*, researchers created a simple mathematical model to simulate the movement of particles (such as viral or bacterial particles) during hand washing. In the model, hands are represented by two rough surfaces that move past each other (to mimic hands scrubbing together), separated by a thin film of liquid.

They found that it takes about 20 seconds to dislodge viral or bacterial particles from our hands.

Bulletin Board

Curiosities

AUG. 20, 2021

The model showed that particles are attracted to the rough surfaces, and a certain amount of energy is required to enable the particles to escape into the fluid. A faster motion of the hands creates a stronger flow of fluid and removes the particles more easily, the authors said.

“If you move your hands too gently, too slowly, relative to one another, the forces created by the flowing fluid are not big enough to overcome the force holding the particle down,” study author Paul Hammond, a scientific consultant at Hammond Consulting Limited in the United Kingdom, said in a statement. Hammond likened the situation to removing a stain from a shirt; a faster scrubbing action removes the stain more easily.

Using reasonable estimates for the variables, including the speed of hand movement, the model revealed that about 20 seconds are needed for the particles to escape. That is in keeping with recommendations from the Centers for Disease Control and Prevention (CDC), which advises people to wash their hands with soap and water for 20 seconds, or about as long as it takes to sing “Happy Birthday” twice.

The CDC’s recommendation is not based on physics modeling, but rather studies of the levels of microbes that remain on hands after washing for certain time periods.

Hammond noted that the new study did not take into account the biological action of soap. Soap not only helps lift dirt and germs from hands, but it also disrupts the membrane surrounding the viral or bacterial particles, thus destroying them. **PLAY SOUND**

Originally published on Live Science.

[livescience.com](https://www.livescience.com), 18 August 2021

<https://www.livescience.com>

Engineers uncover the secrets of fish fins

2021-08-11

The researchers published their results Aug. 11 in the journal *Science Robotics*.

Francois Barthelat, senior author of the study, noted that fins are remarkable because they can achieve feats of dexterity even though they don’t contain a single muscle. (Fish move these structures by twitching sets of muscles located at the base of the fins).

“Each of those rays can be manipulated individually just like your fingers, but there are 20 or 30 of them in each fin.”

Bulletin Board

Curiosities

AUG. 20, 2021

"If you look at a fin, you'll see that it's made of many stiff 'rays,'" said Barthelat, professor in the Paul M. Rady Department of Mechanical Engineering. "Each of those rays can be manipulated individually just like your fingers, but there are 20 or 30 of them in each fin."

In their latest research, Barthelat and his colleagues drew on a range of approaches, including computer simulations and 3D-printed materials, to dive deep into the biomechanics of these agile structures. They report that the key to fish fins may lie in their unique design. Each ray in a fin is made up of multiple segments of a hard material that stack on top of much softer collagen, making them the perfect balance between bouncy and stiff.

"You get this dual capability where fins can morph, and yet they're still quite stiff when they push water," he said.

Armor and airplanes

Barthelat is no stranger to looking into aquariums. He previously studied how fish scales can help engineers to design better body armor for humans, and how seashells might inspire tougher glasses.

Fins may be just as useful. When it comes to engineering, Barthelat explained, materials that are both stiff and flexible are a hot commodity. Airplane designers, for example, have long been interested in developing wings that can morph on command, giving planes more ability to maneuver while still keeping them in the air.

"Airplanes do this now, to some extent, when they drop their flaps," Barthelat said. "But that's in a rigid way. A wing made out of morphing materials, in contrast, could change its shape more radically and in a continuous manner, much like a bird."

To understand how ordinary run-of-the-mill goldfish achieve similar feats every day, take a close look at these structures under the microscope. Each of the rays in a fin has a layered structure, a bit like a bakery éclair: The spikes include two layers of stiff and mineralized materials called hemitrichs that surround an inner layer of spongy collagen.

But, Barthelat said, those layers of hemitrichs aren't solid. They're divided into segments, as if someone had cut up the éclair into bite-sized pieces.

"Until recently, the function of those segments hadn't been clear," he said.

Swimming, flying and walking

Bulletin Board

Curiosities

AUG. 20, 2021

The engineer and his team decided to use computer simulations to examine the mechanical properties of fins. They discovered that those segments can make all the difference.

Pretend for a moment, Barthelat explained, that fish fins are made up entirely of collagen. They could bend easily, but wouldn't give fish much traction in the water because hydrodynamic forces would collapse them. Rays made up of solid, non-segmented hemitrichs, in contrast, would have the opposite problem -- they'd be way too stiff.

"All of the segments, essentially, create these tiny hinges along the ray," Barthelat said. "When you try to compress or pull on those bony layers, they have a very high stiffness. This is critical for the ray to resist and produce hydrodynamic forces that push on water. But if you try to bend individual bony layers, they're very compliant, and that part is critical for the rays to deform easily from the base muscles."

The researchers further tested the theory by using a 3D printer to produce model fish fins made from plastic, some with those hinges built in and some without. The idea panned out: The team found that the segmented design provided better combinations of stiffness and morphing capabilities.

Barthelat added that he and his colleagues have only scratched the surface of the wide diversity of fins in the fish world. Flying fish, for example, deploy their fins to glide above the water, while mudskippers use their fins like legs to walk on land.

"We like to pick up where the biologists and zoologists have left off, using our background in the mechanics of materials to further our understanding of the amazing properties of the natural world," Barthelat said.

Coauthors of the new study include Floren Hannard at the Catholic University of Louvain in Belgium, Mohammad Mirkhalaf at the University of Sydney in Australia and Abtin Ameri at MIT.

sciencedaily.com, 11 August 2021

<https://www.sciencedaily.com>

"This paper represents a significant advance in our understanding of how the hippocampus modulates metabolism," says Elizabeth Gould, a neuroscientist at Princeton University who wasn't involved in the study.

Bulletin Board

Curiosities

AUG. 20, 2021

Ripples in rats' brains tied to memory may also reduce sugar levels

2021-08-11

Ripples of nerve cell activity that lock in memories may have an unexpected job outside of the brain: Dropping blood sugar levels in the body.

Just after a burst of ripples in a rat's hippocampus, sugar levels elsewhere in the body dipped, new experiments show. The curveball results, published August 11 in *Nature*, suggest that certain types of brain activity and metabolism are entwined in surprising and mysterious ways.

"This paper represents a significant advance in our understanding of how the hippocampus modulates metabolism," says Elizabeth Gould, a neuroscientist at Princeton University who wasn't involved in the study.

Neural shudders called sharp-wave ripples zig and zag in the brains of people as they learn new things and draw memories back up (SN: 8/19/19). Ripples also feature prominently during deep sleep. Sleeping mammals, birds and even lizards known as Australian dragons have these bursts of electrical activity. Sharp-wave ripples are thought to accompany the neural work of transforming short-term knowledge into long-term memories.

Neuroscientist David Tingley wondered whether these signals might also change something outside of the brain. Working with neuroscientist György Buzsáki at New York University Grossman School of Medicine and colleagues, Tingley, now at Harvard University, fitted continuous glucose monitors onto the backs of rats. These devices, used by people with diabetes to keep tabs on sugar levels in the fluid around cells, provide a good proxy for blood sugar levels. The researchers simultaneously measured the rats' brain waves with electrodes implanted in the hippocampus, a brain structure that plays a key role in memory.

Every so often, electrodes picked up clusters of ripples. About 10 minutes after a bout of ripples, sugar levels in the body fell, the glucose monitors showed. "We saw these dips in the second rat, and the third rat, and the fourth rat," says Buzsáki. "It was super consistent. The magnitude is small but [the dips] are always there."

To see if this connection between the ripples and the sugar dips was mere coincidence, the researchers forced nerve cells in the hippocampus to fire

Bulletin Board

Curiosities

AUG. 20, 2021

in response to light, creating artificial ripples. Sure enough, after a bout of these forced ripples, the rats' sugar levels dropped.

What's more, when the researchers jammed the ripples' downstream signals with a drug that quiets nerve cells in a brain area called the lateral septum, sugar levels did not drop. That suggests these ripples send signals that ping-pong through the brain and ultimately tell the body to reduce its sugar.

"All of this was very surprising," says Jan Born, a neuroscientist who studies metabolism at the University of Tübingen in Germany. You might expect a busy brain at work to call for more energy, in the form of sugar, not less, says Born, who cowrote a commentary on the new paper in the same issue of *Nature*. But here, "the brain says to the body, 'We don't need so much energy, so go down with your glucose levels.' Why?" says Born, "It's difficult to see its function."

Buzsáki wonders whether these ripples might have evolved initially to aid in metabolism. "They were useful for the body first," he speculates. As time passed, ripples may have been pulled in on other jobs, such as memory storage.

If this newfound link between brain waves and metabolism exists in people, it might suggest a way to influence sugar levels by tweaking ripples, Buzsáki says, an idea that might prove useful for people with diabetes or other metabolic problems. The hippocampus is deep in the brain, but its activity can be altered via magnetic or electrical jolts to easier-to-reach brain areas. Still, changing ripples for metabolic reasons is a far-off idea, Buzsáki cautions.

[sciencenews.org](https://www.sciencenews.org), 11 August 2021

<https://www.sciencenews.org>

TGA tests Australian sunscreens for cancer-causing chemicals following US studies

2021-08-17

Sunscreens sold in Australia will be tested after US studies found they contained two cancer-causing chemicals, Australia's leading medical regulator has confirmed.

The Therapeutic Goods Administration (TGA) said it was investigating whether the products sold across the country contained two carcinogenic substances, benzene and benzophenone.

"The results of this testing will be published on the TGA website when available."

Bulletin Board

Curiosities

AUG. 20, 2021

“The TGA is currently investigating this issue and is conducting testing of samples of sunscreen products containing benzene as well as products containing octocrylene for the presence of benzophenone and compliance with existing standards,” a spokesman said.

“The results of this testing will be published on the TGA website when available.”

In June, US company Valisure tested generic medicines for purity and found nearly 80 sunscreens, including popular brands similar to those sold in Australia, contained benzene.

Then another US laboratory found other sunscreens that contained the permitted ingredient octocrylene had another carcinogen – benzophenone.

Over time octocrylene degraded and produced benzophenone, the study found.

The TGA said it regularly conducted laboratory testing and reviewed the safety of Australian sunscreens.

“However, we have not regularly tested for carcinogens,” the medical regulator said.

US chemical testing laboratory Haereticus Environmental Laboratory wrote to the US medicines regulator the US Food and Drugs Administration asking it to pull all sunscreens that contained octocrylene.

The laboratory claimed an anti-ageing cream ingredient, octocrylene, contained in sunscreen degraded into a toxic chemical – benzophenone – a known carcinogen.

It could also interfere with hormones and “it may act as a reproductive toxicant”, the researchers said.

The presence of benzophenone in food products or food packaging is banned in the United States.

But octocrylene has been approved for use in sunscreens, moisturisers, lip balms, and anti-ageing products in the US.

Brands tested in the scientific research and found to contain the chemical included Coppertone, Banana Boat, Neutrogena, Garnier, LaRoche and L’Oreal.

Bulletin Board

Curiosities

AUG. 20, 2021

The TGA said it was aware of the study’s findings in the US and noted octocrylene was an “approved active ingredient” used in sunscreen products marketed in Australia and overseas at a maximum concentration of 10 per cent.

“Based on currently available data, the TGA does not consider that octocrylene as an ingredient in sunscreens up to the currently permitted concentration presents an unacceptable safety risk when the sunscreens are used as directed,” it said.

The medical regulator also said benzophenone had been reported to be detected only at trace amounts in octocrylene-containing products.

“The TGA is actively monitoring the available data about the carcinogenic potential of benzophenone,” it said.

“There is currently insufficient information to conclude that sunscreens that are compliant with existing requirements for product stability and impurities, such as benzophenone, are unsafe.”

Cancer Council Victoria head of prevention Craig Sinclair said sunscreens sold in Australia that contained octocrylene had met the TGA’s “stringent requirements”.

“There is overwhelming evidence that sunscreens approved for use in Australia by the TGA are safe to use and are effective in preventing skin cancer,” Dr Sinclair said.

“We know that each year around 2000 Australians die of skin cancer, which is why it’s important for Australians to continue to use all five forms of sun protection when UV levels are 3 or above – slip on a shirt, slop on sunscreen, slap on a hat, seek shade and slide on sunglasses.”

news.com.au, 17 August 2021

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

Mount Etna is 100 feet taller than it was 6 months ago

2021-08-13

Mount Etna, Europe’s tallest and most active volcano, has erupted so much in the past six months, it has grown about 100 feet (30 meters) in height, satellite images reveal.

The youngest and most active of Etna’s four summit craters — the southeastern crater — is now the tallest part of the volcano, towering

The youngest and most active of Etna’s four summit craters — the southeastern crater — is now the tallest part of the volcano, towering 11,013 feet (3,357 m) above sea level[.]

Bulletin Board

Curiosities

AUG. 20, 2021

11,013 feet (3,357 m) above sea level, the tallest it has been in recorded history, according to the National Institute for Geophysics and Volcanology (INGV), located at the foot of Mount Etna in Catania, Sicily.

This sudden growth spurt is the result of about 50 eruptions at the southeastern crater since Feb. 16, 2021, which have led to a “conspicuous transformation of the shape of the volcano,” the INGV reported in a translated statement released Aug. 10. Scientists discovered the explosive growth while analyzing images taken by the Earth-imaging Pléiades satellites on July 13 and July 25. The data have an uncertainty of about 10 feet (3 m), the INGV noted. [PLAY SOUND](#)

In fact, the southeastern crater is now taller than its “big brother,” the northeastern crater, the tallest peak on Etna for the past 40 years.

After the northeastern crater erupted in 1980 and 1981, it reached a maximum height of 10,990 feet (3,350 m). But that height decreased over the years as the crater’s edges collapsed. As of the summer of 2018, the northeastern crater measured 10,912 feet (3,326 m) tall.

Mount Etna is thought to have started as a submarine volcano that slowly grew above sea level as it erupted, time and again, gradually increasing its height with solidified lava, according to NASA’s Earth Observatory. It’s now largely covered with historic lava flows from eruptions that happened up to 300,000 years ago. To get a digital 3D view of Etna’s summit, go [here](#).

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[livescience.com](https://www.livescience.com), 13 August 2021

<https://www.livescience.com>

Scientists have a new word for birds stealing animal hair

2021-08-12

Some tiny birds take bold risks to gather a beakful of hair for their nests. Titmice have been spotted dive-bombing cats, alighting on dozing predators’ backs and plucking strands of hair from people’s heads. Now, there’s a term for the unusual behavior: kleptotrarchy.

Derived from the Greek words for “to steal” and “hair,” kleptotrarchy has rarely been described by scientists, but dozens of YouTube videos capture the behavior, researchers report online July 27 in *Ecology*. Titmice — and

Bulletin Board

Curiosities

AUG. 20, 2021

one chickadee — have been caught on video tugging hair from dogs, cats, humans, raccoons and even a porcupine.

“Citizen scientists, bird watchers and people with dogs knew this behavior much more than the scientists themselves,” says animal behaviorist Mark Hauber of the University of Illinois at Urbana-Champaign. “Popular observations precede science rather than the other way around, which is a valid way to do science.”

Scientists counting birds in an Illinois state park in May 2020 spotted a tufted titmouse plucking fur off a dozing, unbothered raccoon. The team dubbed the behavior “kleptotrarchy” after a search of the scientific literature and amateur videos on YouTube turned up more than 100 instances of hair thievery by birds.

Witnessing a bird steal hair from a mammal in the wild is what first inspired Hauber’s colleague, ecologist Henry Pollock, to dig deeper. While counting birds in an Illinois state park in May 2020, Pollock and colleagues spotted a tufted titmouse pluck fur from a sleeping raccoon. “I was like, ‘Wow, I’ve never seen anything like that,’” says Pollock, also of the University of Illinois at Urbana-Champaign.

In South America, palm swifts snatch feathers from flying pigeons and parrots — a behavior already known as kleptoptily. Searching through the scientific literature, Hauber, Pollock and colleagues found only 11 anecdotes of birds stealing hair from live mammals. While most published accounts involve titmice in North America, at least five other bird species get in on the action. Researchers have seen an American crow harvest hair from a cow and a red-winged starling in Africa peck a small antelope called a klipspringer. In Australia, three honeyeater bird species steal fur from koalas.

Meanwhile, a YouTube search by the team turned up 99 videos of tufted titmice, a mountain chickadee and a black-crested titmouse plucking hair from mammals. The latter two bird species had not previously been identified as hair thieves in the scientific literature.

Scientists generally assume that birds gather hair for their nests in low-risk ways, relying on carcasses or stray fluff shed into the wind. “Plucking hairs from raccoons, which are common avian nest predators, suggests that it’s obviously worth it to get that hair,” Pollock says.

Hair-harvesting species tend to live in colder climates, so those birds probably prize hair’s insulating properties, the team says. Some birds

Bulletin Board

Curiosities

AUG. 20, 2021

might also spruce up their nests with mammal hair to confuse would-be predators and parasites (SN: 8/28/01).

sciencenews.org, 12 August 2021

<https://www.sciencenews.org>

Esperance echidna 'spike' shows value of citizen science in face of changing climate

2021-08-18

Lynn Kidd has run an Esperance wildlife sanctuary for eight years and has never seen an echidna in the region.

Although the area has been famous for its beach-hopping kangaroos and wave-riding dolphins, she believed the spiky creatures simply did not live near West Australia's south coast town.

That was until last week when echidnas were reported at two separate Esperance locations.

While some on social media said they had seen the occasional echidna in Esperance before, many more said they had never heard of them in the region at all.

"I haven't seen any," Ms Kidd said.

"I've never had an injured one brought in, I've never even heard of anyone seeing one.

"I would just say it's climate-related. Possibly the drought has made them come further down than what they would normally do so.

"Now we are having loads and loads of rain. Maybe they will end up staying here."

Tahlia Perry, an echidna expert from the University of Adelaide, says Ms Kidd is probably correct, particularly as echidnas run at a lower body temperature than all other mammals.

"It means the hotter it is, the less they can deal with it," Dr Perry said.

"They'll seek out water sources — you'll see them swimming in beaches and in people's bird baths."

"I would just say it's climate-related. Possibly the drought has made them come further down than what they would normally do so."

Bulletin Board

Curiosities

AUG. 20, 2021

She says climate change may be forcing echidnas to migrate, and also says it is now echidna breeding season, which is when they are generally more active.

'Little known' about iconic animal

Dr Perry says even though echidnas are one of the nation's most iconic species, relatively little is known about them.

She says echidnas moving "tens of kilometres a day" and the difficulties they pose in trapping and tracking make them a tricky animal to study.

But in recent years, Dr Perry has set up a citizen science project called Echidna CSI, where the public can upload pictures and videos of their echidna sightings to build a database about populations.

While no Esperance echidnas have been logged yet, she says the closest sightings have been at Fitzgerald River National Park, west of Esperance, and the Dundas Nature Reserve, to the north.

Dr Perry said data from the project indicated that more sightings were occurring in urban areas.

"There have definitely been locations across Australia where we've been getting told they'd never seen them before and now they are," she said.

"Even in the middle of major cities, we are seeing echidnas popping up. Probably because a lot of their habitat is disappearing."

Dr Perry said their biggest threats tended to be habitat loss, feral predation and traffic.

She said echidnas would go basically wherever they could find food and shelter, and had been seen anywhere from deserts to beaches to the snow.

"They are the most widespread native mammal that we've got here," she said.

Citizen science important as climate changes

Citizen science projects — where the public is asked to upload sightings of particular creatures through an app or website to build a database — have leapt in popularity across the globe in recent years.

Last year, one even helped to log Esperance's first ever kookaburra sighting.

Bulletin Board

Curiosities

AUG. 20, 2021

Dr Perry said these projects were crucial for monitoring the health of species, particularly as the climate changed.

“With the echidna, because we don’t know enough about them, they’re still listed as just a ‘least concern’ animal, even though they’ve got major threats,” she said.

“So, the more information we can find about them now, hopefully that can help with even identifying which populations are considered under more major threats.

“That’s true for a lot of animals, which is why there are now so many citizens science projects.

“The more that we can find out about our natural world around us, the more we can make sure that it stays the way it should.”

abc.net.au, 18 August 2021

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

How deadly is the coronavirus delta variant?

2021-08-12

The coronavirus delta variant is more infectious than previous versions of the virus, but is it deadlier?

Early data suggests the delta variant may cause more severe disease, but more studies are needed to know if this variant is indeed deadlier.

Several studies hint that, compared with the original strain of the virus, the delta variant can make people sicker if they are unvaccinated. One study from Scotland, published June 14 in the journal *The Lancet*, found that people infected with the coronavirus delta variant had a nearly twofold higher risk of being hospitalized between April and June 2021, compared with those infected with the coronavirus alpha variant, or the variant first detected in the U.K. But those who were vaccinated had a 60% reduced risk of being hospitalized with the delta variant than unvaccinated people who caught delta.

Another study from Canada, posted to the preprint website medRxiv on July 14, found that people infected with the delta variant were twice as likely to be hospitalized, and twice as likely to die, as those infected with a coronavirus strain that wasn’t a “variant of concern” (i.e., not infected with alpha, beta, gamma or delta variants).

Bulletin Board

Curiosities

AUG. 20, 2021

Still, these studies are preliminary, and more research is needed to show whether delta really causes more severe disease than previous variants. Delta may appear more serious than other variants simply because it caused outbreaks in populations with more risk factors for severe illness (such as older age or underlying conditions), or because outbreaks occurred in areas with more stress on their hospital systems, according to the American Society for Microbiology.

It’s also unclear how the death rate from the delta variant compares with that from other variants. The overall case-fatality ratio (the number of deaths divided by the total number of cases) for COVID-19 in the U.S. since the beginning of the pandemic is 1.7%, according to data from Johns Hopkins University. However, this fatality rate includes deaths long before the availability of COVID-19 vaccines. Since the delta variant took off in the U.S. after the availability of vaccines, it’s difficult to compare deaths from delta with historical deaths from earlier variants — the fatality rate for all variants is expected to drop as a result of vaccinations, according to The Poynter Institute.

What is clear is that current COVID-19 vaccines reduce the risk of infection, severe disease and death from the novel coronavirus, including the delta variant. Using data on the current rate of COVID-19 infections in the U.S., the CDC estimates that fully vaccinated people are eight times less likely to have a symptomatic infection, 25 times less likely to be hospitalized, and 24 times less likely to die from COVID-19 infection than those who are unvaccinated.

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<https://www.livescience.com>

Bulletin Board

Technical Notes

AUG. 20, 2021

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

CHEMICAL EFFECTS

Oxidation of antibiotics by ferrate(VI) in water: Evaluation of their removal efficiency and toxicity changes

Bone developmental toxicity of organophosphorus flame retardants TDCIPP and TPhP in marine medaka *Oryzias melastigma*

Toxicokinetic Models for Bioconcentration of Organic Contaminants in Two Life Stages of White Sturgeon (*Acipenser transmontanus*)

ENVIRONMENTAL RESEARCH

Phenomics Approach to Investigate Behavioral Toxicity of Environmental or Occupational Toxicants in Adult Zebrafish (*Danio rerio*)

Polyvinyl chloride in consumer and environmental plastics, with a particular focus on metal-based additives

Sex reversal and ontogeny under climate change and chemical pollution: are there interactions between the effects of elevated temperature and a xenoestrogen on early development in agile frogs?

HYGIENIC ASSESSMENT OF WORKPLACE ENVIRONMENTAL AIR POLLUTION OF TBILISI CITY MUNICIPAL TRANSPORT AND THEIR SERVICES

OCCUPATIONAL

A longitudinal study of working hours and chronic kidney disease in healthy workers: The Kangbuk Samsung Health Study

[Occupational diseases of the airways and the lungs]

PHARMACEUTICAL/TOXICOLOGY

A PBPK model describing the pharmacokinetics of γ -HBCD exposure in mice