

# Bulletin Board

## Contents

MAR. 12, 2021

(click on page numbers for links)

### REGULATORY UPDATE

#### ASIA PACIFIC

NSW government bans PFAS for fire fighting training, with full ban from September 2022.....	4
China to restrict 117 hazardous substances in consumer products from 1 June.....	4

#### AMERICA

Gillibrand, Rep. Maloney announce bill to protect firefighters from PFAS...	6
OSHA's proposed updates to HazCom: What small businesses need to know .....	7
GAO report states EPA has completed some regulatory-related actions for PFAS .....	9

#### EUROPE

EC considers full revision of existing FCM legislation .....	10
--	----

#### INTERNATIONAL

How I got obsessed with chemicals and broke my hairdresser's heart.....	12
Climate change is leading to premature births in the Brazilian Amazon ...	12

### REACH UPDATE

Evaluation activities sped up by assessing chemicals in groups .....	14
ECHA begins public consultation on derogation to the exclusion criteria for creosote.....	15

### JANET'S CORNER

Brain Food.....	18
-----------------	----

### HAZARD ALERT

4,6-Dinitro-o-cresol .....	19
----------------------------	----

### GOSSIP

Fossil fuel cars make 'hundreds of times' more waste than electric cars.....	24
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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

Cats are too socially inept to be loyal .....	26
Food waste: Amount thrown away totals 900 million tonnes .....	28
A new effect of red ginseng: suppression of lung cancer metastasis .....	30
Subtle quantum phenomenon found to alter chemical reactivity for the first time .....	32
Meet the swirion, a new kind of matter that bends the law of physics .....	33
Rare Australian bee rediscovered after nearly a century .....	35
Cuttlefish show self-control, pass 'marshmallow test' .....	37
People who have had COVID-19 might need only one shot of a coronavirus vaccine .....	40
The price of working from home? A 7% rise in housing costs, report reveals .....	40

## CURIOSITIES

Volvo plans to sell only electric cars by 2030 .....	43
Link found between cannabis and redound headaches after migraine .....	45
Sesaminol: Parkinson's disease's surprise medicine .....	48
The genes behind the sexiest birds on the planet .....	49
DNA databases are too white, so genetics doesn't help everyone. How do we fix that? .....	52
Compound isolated from sea sponge fights cancer cells .....	60
FDA continues investigation into dog heart damage linked to diet .....	62
When should you end a conversation? Probably sooner than you think .....	64
Female green tree frogs have noise-canceling lungs that help them hear mates .....	66
Sherlock Holmes' famous memory trick really works .....	68

## TECHNICAL NOTES

(Note: Open your Web Browser and click on Heading to link to section) ...	71
CHEMICAL EFFECTS .....	71
ENVIRONMENTAL RESEARCH .....	71
OCCUPATIONAL .....	71
PHARAMACEUTICAL/TOXICOLOGY .....	71

MAR. 12, 2021

# Bulletin Board

## Regulatory Update

MAR. 12, 2021

### ASIA PACIFIC

#### NSW government banes PFAS for fire fighting training, with full ban from September 2022

2021-03-03

PFAS firefighting foams have been banned in NSW from today in firefighting training, with further restrictions on their use in fire extinguishers to take effect in 18 months' time.

The March 1 ban was announced by NSW Environment Minister Matt Kean, who said yesterday that the Berejiklian government's PFAS regulations would significantly reduce environmental impacts while allowing emergency agencies to use the products in defined "catastrophic" or "special" situations.

[Read More](#)

Port Stephens Examiner, 3 March 2021

<https://www.portstephensexaminer.com.au/story/7151129/pfas-foam-banned-from-today-in-firefighting-training/>

#### China to restrict 117 hazardous substances in consumer products from 1 June

2021-01-21

##### 'Voluntary' requirements similar to EU REACH Annex XVII provisions

China is introducing a voluntary standard that will restrict the use of 117 hazardous substances in consumer items in a similar way to restrictions under EU REACH Annex XVII.

The Guidelines for Controlling the Use of Key Chemical Substances in Consumer Products are set to come into force on 1 June.

It will apply to all consumer products, including their components, parts, accessories, instructions and packaging. But it will not apply to goods that are regulated separately, such as food, pharmaceuticals and cosmetics.

While the standard is currently voluntary, an industry source who wished to remain anonymous told Chemical Watch that "companies – especially leading companies – are expected to follow them".

... the Berejiklian government's PFAS regulations would significantly reduce environmental impacts while allowing emergency agencies to use the products in defined "catastrophic" or "special" situations.

# Bulletin Board

## Regulatory Update

MAR. 12, 2021

Despite the title of 'guidelines', the State Administration for Market Regulation and the China National Standardization Administration published the document as a voluntary national technical standard – GB/T 39498-2020 – on 20 November.

The final version adds 14 hazardous substances to the list outlined in the 2017 draft version, bringing the total to 117. Most of the additional substances are those that will be restricted in toys and include:

- heavy metals;
- polycyclic aromatic hydrocarbons (PAHs);
- phthalates;
- azo-dyes;
- benzene; and
- phenols.

The Guidelines outline the safety requirements for each substance and the migration limits for specific products, including:

- children's products;
- jewellery;
- textiles;
- coatings;
- furniture; and
- leather goods.

They also indicate on which national or international regulations the restrictions are modelled, for example, other Chinese standards or EU REACH.

When the draft version was published in March 2017, Eric Zhu, APAC regulatory supervisor for consultancy Intertek, told Chemical Watch that "the Guidelines will reduce what are effectively trade barriers, based on lack of compliance with regulations in overseas markets. They will also allow clear, transparent market regulation and inform product development, innovation and safety control for industry".

The final standard also includes analytical methods in Appendix A that companies can use to determine the contents of hazardous substances in consumer products.

# Bulletin Board

## Regulatory Update

MAR. 12, 2021

[Read More](#)

Chemical Watch, 21 January 2021

<https://chemicalwatch.com/204501/china-to-restrict-117-hazardous-substances-in-consumer-products-from-1-june>

### AMERICA

#### Gillibrand, Rep. Maloney announce bill to protect firefighters from PFAS

YYYY-MM-DD

New York U.S. Senator Kirsten Gillibrand and Congressman Sean Patrick Maloney were in Newburgh Monday announcing legislation to protect firefighters from PFAS.

The two Democratic federal lawmakers were at the City of Newburgh Fire Department, where they announced the PFAS Firefighter Protection Act. Gillibrand says the legislation would build on New York State's efforts to restrict foams containing PFAS. It also sets deadlines for airports for prohibiting the use of PFAS firefighting foams.

"It would put much needed new prohibition in place against using firefighting foam that has PFAS chemicals," Gillibrand says. "It would create a federal ban on the manufacture, importation and sale of firefighting foam that contains PFAS within two years of enactment."

On the job for a matter of days, Newburgh Fire Chief Francis Spinelli talks about how the legislation would affect firefighter crews in the city and across the country.

"New York already has some of this on the books, and they go through, the Department of Environmental Conservation has rules and regulations, but this is going to expand it to where we can start to address the chemicals that are in our turnout gear," Spinelli says. "Our firefighter turnout gear is also manufactured with these products in it. So when our people are hot and sweaty and in hazardous atmospheres, we're absorbing this chemical into our bodies. So this is, this is going to have a long-reaching effect on everything."

In 2016, PFOS drinking water contamination came to light in Newburgh, where the chemical found in Washington Lake emanated from Stewart Air National Guard base because of the historic use of firefighting foam. The

**"It would create a federal ban on the manufacture, importation and sale of firefighting foam that contains PFAS within two years of enactment."**

# Bulletin Board

## Regulatory Update

MAR. 12, 2021

city switched to the Catskill Aqueduct for its drinking water, which is still in place today. Gillibrand points out that PFAS, or per- and polyfluoroalkyl substances dubbed “forever chemicals”, have been used in non-stick products, such as in cookware.

“They’re also used in firefighting, in the firefighting foam and in the clothing and gear that firefighters use, meaning that products meant to protect firefighters to help them put out the fires actually put them in danger,” Gillibrand says.

[Read More](#)

WAMC Northeast Report, 22 February 2021

<https://www.wamc.org/post/gillibrand-rep-maloney-announce-bill-protect-firefighters-pfas>

### OSHA’s proposed updates to HazCom: What small businesses need to know

2021-02-23

The U.S. Occupational Safety and Health Administration (OSHA) announced earlier this month that they have issued a proposed rule to update the Hazard Communication regulation, commonly referred to in industrial spaces as “HazCom.”

HazCom, which was overhauled in 2012 and updated again in 2015, is part of OSHA’s continuous effort to remain aligned with the United Nations’ Globally Harmonized System of Classification and Labelling of Chemicals (GHS). This coordination effort ensures all hazards that are associated with chemicals are thoroughly, correctly, and consistently communicated to everyone who uses them.

Even further updates to the Hazard Communication regulation are certain once this current rulemaking period is completed, as the 8th revision of the GHS was published in 2019 and the 9th revision is scheduled to publish later this year in October.

What Is the “GHS?”

The Globally Harmonized System of Classification and Labelling of Chemicals is commonly referred to by its acronym “GHS” and is managed by the United Nations. Developed to provide a consistent means of identifying and communicating the hazards associated with chemicals that are manufactured and used globally, the establishment of the GHS

# Bulletin Board

## Regulatory Update

MAR. 12, 2021

and its integration into the chemical safety regulations of nations around the world brought about many changes in identifying and communicating chemical hazards.

One significant change was the global standardization of the former “Material Safety Data Sheet” (MSDS) and its equivalents. Now referred to as the “Safety Data Sheet” (SDS), manufacturers of chemicals must now utilize the same format for their SDSs and ensure that SDSs all contain the same types of information. This standardization eliminated the inconsistency of information that was being communicated on chemical hazards globally.

Another significant change was the global standardization of hazard symbols used on SDSs, and on primary and secondary chemical container labels that communicate the types of health, flammability, reactivity and other hazards associated with chemicals. Previously, U.S. chemical manufacturers used the National Fire Protection Agency (NFPA) fire diamond and/or previous versions of the American Coatings Association (ACA) Hazardous Materials Information System (HMIS) ratings to communicate a chemical’s health, flammability, reactivity and other hazards.

As a result, similarly with the former MSDS and its equivalents, there was no consistency in the hazard symbols used by chemical manufacturers around the world. This standardization resolved the inconsistency issue with the hazard symbols.

HazCom and GHS Requirements and Recommendations for Small Businesses

The hope is that in 2021, all small business employers have implemented a GHS-compliant hazard communication program. After OSHA’s initial integration of the GHS into the Hazard Communication regulation in 2012, all employers, including small businesses, were granted a 3-year transition period to implement a GHS-compliant hazard communication program.

This includes making the changes mentioned above with replacing their facilities’ MSDSs with SDSs and ensuring their primary and secondary chemical container labels display the GHS hazard symbols. Also required is keeping an up-to-date inventory of all hazardous chemicals in use at their facilities and training employees on their GHS-compliant hazard communication program.

However, the reality is that Hazard Communication has been on OSHA’s annual Top 10 list of most frequently violated regulations for at least the

**This coordination effort ensures all hazards that are associated with chemicals are thoroughly, correctly, and consistently communicated to everyone who uses them.**

# Bulletin Board

## Regulatory Update

MAR. 12, 2021

past 15 years. So for those small business employers who have not yet implemented a GHS-compliant hazard communication program, today is a great day to start. OSHA's [small business guide](#) for hazard communication provides detailed information that guides these efforts.

Further, Hazard Communication benefits anyone who works with hazardous chemicals. Therefore, one-person operations as well as sole proprietors and LLCs who only have independent contractors working for them or family members helping operate their businesses can always go the extra mile and utilize OSHA resources, like the hazard communication small business guide, to implement a GHS-compliant hazard communication program for their businesses as well, even though they may not be required by law to do so.

[Read More](#)

Thomas Insights, 23 February 2021

<https://www.thomasnet.com/insights/osha-s-proposed-updates-to-hazcom-what-small-businesses-need-to-know/>

### GAO report states EPA has completed some regulatory-related actions for PFAS

2021-03-02

On March 1, 2021, the U.S. Government Accountability Office (GAO) publicly released a report entitled ***Man-Made Chemicals and Potential Health Risks: EPA Has Completed Some Regulatory-Related Actions for PFAS***. GAO was asked to examine the status of regulatory-related actions in EPA's 2019 *Per- and Polyfluoroalkyl Substances (PFAS) Action Plan*. GAO found that EPA completed three of six selected regulatory-related actions for addressing PFAS outlined in the *PFAS Action Plan*. For two of the three completed actions, the steps EPA took were also in response to the National Defense Authorization Act for fiscal year 2020 (FY20 NDAA):

- After proposing a supplemental significant new use rule (SNUR) in February 2020, EPA met a June 2020 deadline set in the FY20 NDAA when the EPA Administrator signed the final rule. Among other things, under the final rule, articles containing certain PFAS as a surface coating, and carpet containing certain PFAS, can no longer be imported into the United States without EPA review; and EPA incorporated 172 PFAS into the Toxics Release Inventory in June 2020. The FY20 NDAA directed EPA to take this action, extending EPA's

# Bulletin Board

## Regulatory Update

MAR. 12, 2021

original planned action to explore data for listing PFAS chemicals to the inventory.

Finally, in March 2020, EPA completed a third regulatory-related action, not required under the FY20 NDAA, when it proposed a preliminary drinking water regulatory determination for two PFAS, "an initial step toward regulating these chemicals in drinking water."

According to GAO, three of the six selected regulatory-related actions are ongoing, and EPA's progress on these actions varies:

- As of August 2020, EPA was developing a proposed rulemaking for a nationwide drinking water monitoring rule that includes PFAS, which EPA officials stated that EPA intends to issue in final by **December 2021**; EPA is currently examining available information about PFAS discharges to surface water to identify industrial sources that may warrant further study for potential regulation through EPA's National Effluent Limitations Guidelines. EPA expects to publish a final *Effluent Guidelines Program Plan 14* in **early 2021** that will include an update on the current status of EPA's multi-industry study; and EPA plans to continue the regulatory process for designating two PFAS as hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), which would allow EPA to require responsible parties to conduct or pay for cleanup. On January 14, 2021, EPA issued an advance notice of proposed rulemaking for the hazardous substances designation to obtain public comment and data to inform EPA's ongoing evaluation of the two PFAS.

[Read More](#)

TSCA Blog, 2 March 2021

<http://www.tscablog.com/entry/gao-report-states-epa-has-completed-some-regulatory-related-actions-for-pfa>

## EUROPE

### EC considers full revision of existing FCM legislation

2021-02-26

European Commission (EC) policy officer discusses benefits of revising Article 3 of existing food contact material (FCM) Regulation 1935/2004, suggests this would ensure 'future-proof' legislation; alternative

**The over 300 responding stakeholders were split over whether amendments to the existing legislative text are sufficient or if it is necessary to completely revise the regulatory framework.**

# Bulletin Board

## Regulatory Update

MAR. 12, 2021

approaches being considered based on amending existing legislation; considers fee for chemical assessment and market surveillance.

On February 26, 2021, news provider *Chemical Watch* reported on the results of their food contact regulations conference where *European Commission (EC)* policy officer, Jonathan Briggs, discussed the benefits of a complete revision of Article 3 within the current EU food contact material (FCMs) legislation 1935/2004 as well as allocating collected industry fees to market surveillance.

Briggs reported on the consultation comments received on its inception impact assessment between December 2020 and January 2021 (FPF reported and submitted comments). The over 300 responding stakeholders were split over whether amendments to the existing legislative text are sufficient or if it is necessary to completely revise the regulatory framework. Briggs discussed that it is possible to use the existing framework of Article 3 within Regulation 1935/2004, which states that "FCMs should not endanger human health or bring about an unacceptable change in the composition of food." However, he cautioned that this approach would limit the *EC* in its goal to achieve "future-proof" legislation. According to Briggs, the decision on which approach will be applied in the end is still being considered.

Regarding a proposed fee structure for chemical assessment and surveillance as proposed by a recent *ANEC* report (FPF reported), Briggs warned that fees for chemical assessment could slow down innovation and have negative effects on small and medium-sized enterprises (SMEs). He sees a greater chance for implementing a market surveillance fee using delegated or notified bodies.

The *EC* will carry out a full impact assessment for their revised FCM policy (FPF reported), and a legislative proposal is expected to be finalized in the fourth quarter of 2022.

### [Read More](#)

Food Packaging Forum, 26 February 2021

<https://www.foodpackagingforum.org/news/ec-considers-full-revision-of-existing-fcm-legislation>

# Bulletin Board

## Regulatory Update

MAR. 12, 2021

### INTERNATIONAL

#### How I got obsessed with chemicals and broke my hairdresser's heart

2021-03-02

I am approaching one year working as a policy advisor for ChemSec. Like most other people being plunged into the world of chemicals, the way I viewed the world changed – and so did my behavior – when I started to learn more about chemicals. For a time, I compulsively read the table of content for different products, keen on identifying hazardous chemicals.

My girlfriend found it frustrating that it suddenly took forever to go grocery shopping. I argued that this was a part of my new trade, a matter of professionalism on my part, to be informed. I insisted it was not an unreasonable behavior; she persisted I had gone crazy. Of course, she had a point.

It is important to make relevant information about all products available. Consumers do, after all, have a responsibility to make as well-informed decisions as possible for the market power to work in the right direction. In a way, the table of content creates both transparency and liability.

However, the truth is that most people have no idea what the different substances listed are. The words are oftentimes so complex and confusing that no one bothers even trying to understand them. Sometimes, it feels like someone purposefully wrote the table of content in a way so that no questions would be raised. Take for example the substance octafluoropentyl methacrylate. Reading it out loud, how do you even pronounce that!?

### [Read More](#)

Chemsec, 2 March 2021

<https://chemsec.org/how-i-got-obsessed-with-chemicals-and-broke-my-hairdressers-heart/>

#### Climate change is leading to premature births in the Brazilian Amazon

2021-03-01

Extreme weather patterns and flooding worsened by climate change are adversely affecting the health of babies born in the Amazon rainforest.

**For a time, I compulsively read the table of content for different products, keen on identifying hazardous chemicals.**

# Bulletin Board

## Regulatory Update

MAR. 12, 2021

Luke Parry at Lancaster University, UK, and his colleagues compared levels of rainfall with the birth weights and pregnancy duration of nearly 300,000 babies born between 2006 and 2017 in the Brazilian Amazon. They found that babies in riverside communities were more likely to be born premature (before 37 weeks) and underweight following extreme weather like floods and droughts. Low birth weights and prematurity are associated with negative outcomes in education, health and income throughout life and subsequent generations.

Babies born after periods of extreme rainfall were on average 183 grams lighter than those born at other times, with the gap increasing to 646 grams in the most socioeconomically disadvantaged groups. This difference is higher than in previous studies examining the impact of extreme weather on babies in other countries such as India, Mexico and Vietnam. The effect was present even when controlling for pregnancy duration – in other words, the lower birth weight wasn't solely due to prematurity.

Floods in the Amazon following extreme weather mean pregnant women have less access to nutritious food due to crop failure and are more likely to contract infectious diseases spread by mosquitoes, which thrive in wet conditions. Both are likely to contribute to low birth weight and premature birth. Anxiety and stress following flooding may also play a role, say the researchers.

[Read More](#)

New Scientist, 1 March 2021

<https://www.newscientist.com/article/2269574-climate-change-is-leading-to-premature-births-in-the-brazilian-amazon/#ixzz6oCZTHj5P>

# Bulletin Board

## REACH Update

MAR. 12, 2021

### Evaluation activities sped up by assessing chemicals in groups

2021-02-24

ECHA/NR/2021/10

In 2020, ECHA checked 1 900 chemicals to identify a need for further assessment. Registrations for 258 chemicals were also checked for compliance with the REACH requirements. Better quality safety data from companies is still needed to clarify the long-term effects of chemicals.

Helsinki, 24 February 2021 – Checking similar chemicals in groups helps ECHA to select substances more efficiently for assessment. This is one more step towards achieving the legal goal of checking the compliance of 20 % of all registration dossiers in every tonnage band.

In 2020, ECHA checked 1 900 substances and conducted 271 compliance checks addressing 258 substances in 240 draft decisions. This led to 1 365 requests to generate information for clarifying the long-term effects on human health or the environment. These include effects on the development of unborn children, reproductive toxicity or genetic mutations; or, further clarifications on persistent, bioaccumulative and toxic properties of chemicals in the environment. ECHA also examined 130 proposals from industry to carry out further testing on their chemicals.

Bjorn Hansen, ECHA's Executive Director says: "We have a responsibility towards Europe's citizens to make sure that chemicals data is correct and up to date. By checking chemicals in groups, we continue our assessment at full speed. Companies also need to speed up and review their registration dossiers. I welcome industry's voluntary action plans on updating dossiers which many companies have already joined."

Substance evaluation is done by Member States to clarify if the use of a substance poses risks to people or the environment. In 2020, clearer drafting of the decisions and work in expert groups resulted in faster decision-making. ECHA adopted 18 substance evaluation decisions, requesting further information to assess the safety of substances of potential concern. Member States further concluded the assessment of 13 substances indicating a need for further regulatory follow-up action at EU level.

ECHA's evaluation statistics overview presents a full breakdown of the numbers. The Agency has updated its recommendations for companies on how they can improve their registration data.

**Checking similar chemicals in groups helps ECHA to select substances more efficiently for assessment.**

# Bulletin Board

## REACH Update

MAR. 12, 2021

To increase transparency, ECHA also publishes for the first time a list of the substances evaluated in 2020. This list includes full details on the information requests that have been issued to companies as part of ECHA's decisions.

[Read More](#)

ECHA, 24 February 2021

<https://echa.europa.eu/-/evaluation-activities-spiced-up-by-assessing-chemicals-in-groups>

### ECHA begins public consultation on derogation to the exclusion criteria for creosote

2021-03-02

The European Chemicals Agency (ECHA) has begun a public consultation on a derogation to the exclusion criteria for creosote for product type 8 (PT 8; wood preservatives). Under the European Union (EU) Biocidal Products Regulation (BPR), active substances that meet the exclusion criteria can be approved or renewed only if they meet one or more of the following derogation criteria: exposure is negligible; the active substance is essential to prevent a serious danger to human or animal health or the environment; or not approving the substance would have a disproportionate negative impact on society compared to the risks. Comments on whether the conditions for derogation are met for creosote for PT 8 are due March 30, 2021.

Active substances meeting the following exclusion criteria are typically not approved or renewed under the BPR:

Carcinogens, mutagens, and reprotoxic (CMR) substances categories 1A or 1B according to the Classification, Labelling and Packaging (CLP) Regulation;

Endocrine disruptors;

Persistent, bioaccumulative, and toxic (PBT) substances; and

Very persistent and very bioaccumulative (vPvB) substances.

According to the Biocidal Products Committee (BPC) opinion on the application for renewal of the approval, creosote in PT 8 is used as a wood preservative, as a fungicide and insecticide against wood-rotting fungi, against wood rot in soil and water contact, and against insects.

# Bulletin Board

## REACH Update

MAR. 12, 2021

The BPC opinion states that creosote meets the exclusion criteria as it is classified under CLP as carcinogen category 1B; it is proposed to be classified as toxic for reproduction category 1B; and it meets the criteria for being PBT and vPvB. Since creosote meets the exclusion criteria, "the overall conclusion of the BPC is that the approval of creosote in product type 8 should normally not be renewed, unless one of the conditions for derogation in Article 5(2) is met."

As reported in our February 9, 2021, memorandum, "Following Brexit, UK Establishes New Chemical Regulatory Regimes," biocidal active substances and products in Northern Ireland are still regulated under the EU BPR. A derogation for creosote for PT 8 would allow it to be approved for use in biocidal products in the EU, including Northern Ireland. A derogation approved in the EU will not apply in Great Britain (GB) under the GB BPR.

Commentary

The PT 8 category covers biocidal products "Used for the preservation of wood, from and including the saw-mill stage, or wood products by the control of wood-destroying or wood-disfiguring organisms, including insects." It includes both preventive and curative products. The category has been a challenging one under BPR. Many active substances were submitted but never approved; seven of 43 active substances that were previously or are currently authorized have expired, and creosote is one of nine substances undergoing reevaluation at present. Creosote is a substance of unknown or variable composition containing anthracene and polycyclic aromatic hydrocarbons, both of which are considered to be non-threshold carcinogens; it meets more than one of the exclusion criteria and therefore is considered a candidate for substitution. The product faces an uphill battle to demonstrate that it meets one or more of the derogation criteria to renew its approval. The process of renewing an approval is a complex one and requires the submission of studies and data to demonstrate the product's safety, in spite of meeting the exclusion criteria. Based on the submitted studies and data, BPC is of the opinion that approval should not be renewed. With the protection of human health and the environment in the foreground, and suitable chemical and non-chemical alternatives available, it is likely that the product will not be approved for renewal.

**Comments on whether the conditions for derogation are met for creosote for PT 8 are due March 30, 2021.**

# Bulletin Board

## REACH Update

MAR. 12, 2021

[Read More](#)

JD Supra, 2 March 2021

<https://www.jdsupra.com/legalnews/echa-begins-public-consultation-on-7592707/>

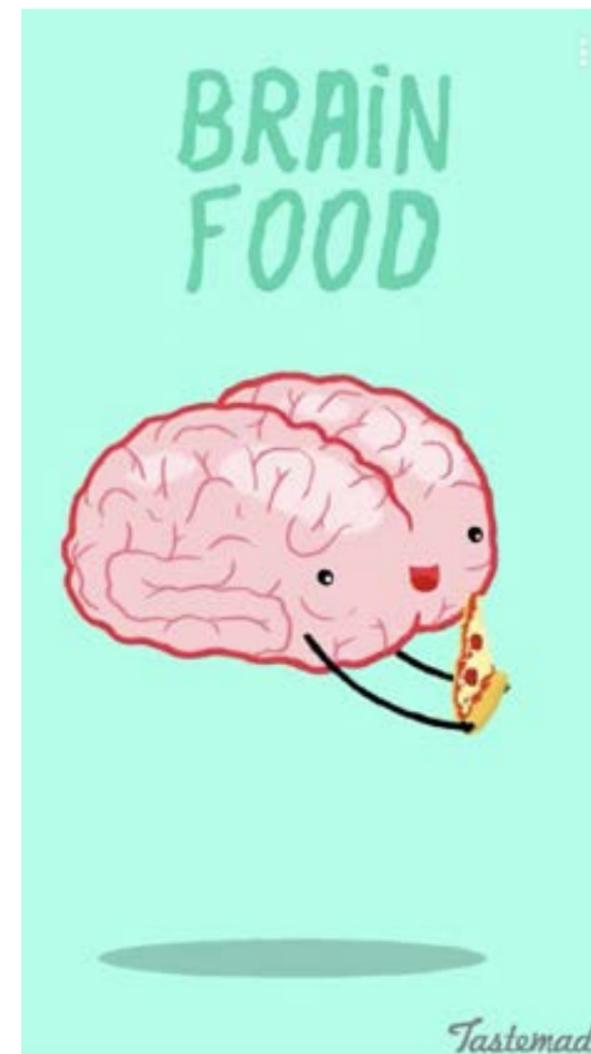
# Bulletin Board

## Janet's Corner

MAR. 12, 2021

**Brain Food**

2021-03-12



<https://i.pinimg.com/originals/3c/9e/64/3c9e64f9500daba243a22dda64f5a6cf.png>

# Bulletin Board

## Hazard Alert

MAR. 12, 2021

### 4,6-Dinitro-o-cresol

2021-03-12

Dinitro-o-cresol (DNOC) is an organic compound with the structural formula  $\text{CH}_3\text{C}_6\text{H}_2(\text{NO}_2)_2\text{OH}$ . [1] DNOC is a yellow solid with no smell. The taste of DNOC is not known. It dissolves slightly in water. [2]

#### USE [2,3]

DNOC was primarily used to protect fruit trees and other food crops from insect damage. In 1991, the United States EPA cancelled DNOC's registration as a pesticide. Another less expensive chemical that is more effective in controlling pests is replacing DNOC. In the 1930s, DNOC was used in pills for reducing weight. It is no longer used for this purpose because of bad effects on health.

#### IN THE ENVIRONMENT [2]

- Air: DNOC destruction in air from chemical reactions with other pollutants or from interaction with sunlight may be insignificant. It eventually returns from air to land and water by settling and washout by snow and rainwater. It is unknown how long DNOC stays in the air before it is fully removed.
- Water: No known chemical reaction removes significant amounts of DNOC from water. In water, microorganisms may slowly break down DNOC. DNOC does not appreciably evaporate from water. Some of the DNOC sticks to particles present in water. This process partially transfers DNOC from water to the bottom sediment.
- Soil: No known chemical reaction removes significant amounts of DNOC from soil. Microorganisms break down DNOC in soil. The loss of DNOC from soil by evaporation is not significant. DNOC has been found in groundwater from fields where it was applied. The level of DNOC in soil may decrease to half its original level in an estimated 14 days to 1 month or longer.

#### SOURCES & ROUTES OF EXPOSURE

##### Sources of Exposure [2,3]

People can be exposed to DNOC by breathing contaminated air, drinking contaminated water, or eating contaminated food. Other than in certain workplaces, levels of DNOC in the air have not been measured. However, the ambient level is expected to be very low. The levels of DNOC in

# Bulletin Board

## Hazard Alert

MAR. 12, 2021

drinking water and food also have not been detected. Certain people may be exposed to slightly higher levels of DNOC. People who live near sites containing DNOC wastes may be exposed primarily by breathing contaminated air. Children playing at or near these sites will be exposed by touching and eating soil if that soil contains DNOC. You may be exposed to DNOC if your work involves manufacturing, preparing, or using formulated DNOC products. You may be exposed if you work as a sprayer of DNOC. You also may be exposed to DNOC if your work involves incinerating waste containing DNOC or cleaning up sites contaminated with DNOC.

#### Routes of Exposure [4]

The major routes of exposure to DNOC are:

- Inhalation
- Skin absorption
- Ingestion
- Skin and/or eye contact

#### HEALTH EFFECTS [3]

##### Acute Effects

- Increased basal metabolic rates have resulted in humans following acute and chronic exposures to DNOC. Symptoms of toxicity from acute exposure include profuse sweating, increased pulse rate, increased respiratory rate, thirst, fatigue, lethargy, headache, nausea, appetite loss, malaise, collapse, coma and greenish-yellow pigmentation of the conjunctivae in humans. Yellow colouring of the hands, nails, and hair may also result.
- Damage to the liver, kidney, and nervous system have been reported in humans following acute exposure.
- DNOC is an uncoupler of oxidative phosphorylation, which accounts for its extreme acute toxicity.
- Dermal contact may lead to local necrosis.
- Acute animal tests in rats, mice, rabbits, and guinea pigs have demonstrated DNOC to have extreme acute toxicity from oral exposure and high acute toxicity from dermal exposure.

##### Chronic Effects

- Chronic exposure results in the same symptoms of toxicity in humans as acute exposure.

**Dinitro-o-cresol (DNOC) is an organic compound with the structural formula  $\text{CH}_3\text{C}_6\text{H}_2(\text{NO}_2)_2\text{OH}$ .**

# Bulletin Board

## Hazard Alert

MAR. 12, 2021

- Bilateral cataracts and blindness have been observed in individuals chronically exposed to DNOC by ingestion.
- Respiratory, cardiovascular, gastrointestinal, and CNS effects in chronically exposed workers have been reported.
- Decreased weight gain and food consumption have been observed in rats chronically exposed to DNOC by ingestion. Changes in the blood and urine, decreased liver enzyme activity, and changes in the absolute and relative organ weights (increased weights of the heart, brain, liver, kidney, spleen, adrenals, and thyroid and decreased weights of the thymus, uterus, ovaries, testes, and prostate gland) were also reported in rats; increased liver weight was described at all concentrations of exposure.
- EPA has not established a Reference Concentration (RfC) or a Reference Dose (RfD) for DNOC.
- ATSDR has established an intermediate oral minimal risk level (MRL) of 0.004 milligrams per kilogram body weight per day (mg/kg/d) based on neurological effects in humans. The MRL is an estimate of the daily human exposure to a hazardous substance that is likely to be without appreciable risk of adverse noncancer health effects over a specified duration of exposure. Exposure to a level above the MRL does not mean that adverse health effects will occur. The MRL is intended to serve as a screening tool.

### Reproductive/Developmental Effects

- No information is available on the reproductive or developmental effects of DNOC in humans.
- DNOC had no teratogenic or embryotoxic effects in several animal studies, while chromosomal aberrations were reported in the fetuses of pregnant mice given DNOC by gavage.
- One animal study reported that DNOC affected spermatogenesis, while another study did not find similar results.

### Cancer Risk

- No information is available on the carcinogenic effects of DNOC in humans or animals.
- EPA has not classified DNOC for potential carcinogenicity.

# Bulletin Board

## Hazard Alert

MAR. 12, 2021

### SAFETY [5]

### FIRST AID MEASURES

- Eyes: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid immediately.
- Skin: In case of contact, get medical aid immediately. Immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes.
- Ingestion: If swallowed, get medical aid immediately. Only induce vomiting if directed to do so by medical personnel. Never give anything by mouth to an unconscious person.
- Inhalation: If inhaled, get medical aid immediately. Remove victim to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

### Exposure Controls & Personal Protection

#### Engineering Controls

Facilities storing or utilising DNOC should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

#### Personal Protective Equipment

The following personal protective equipment is recommended when handling DNOC:

- Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
- Skin: Wear appropriate protective gloves to prevent skin exposure.
- Clothing: Wear appropriate protective clothing to prevent skin exposure.
- Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

## Bulletin Board

## Hazard Alert

MAR. 12, 2021

## REGULATION [2,6,7]

## United States

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

- General Industry: 0.2 mg/m<sup>3</sup> (Skin)
- Construction Industry: 0.2 mg/m<sup>3</sup> TWA (Skin)

ACGIH: The American Conference of Governmental Industrial Hygienists has established a Threshold Limit Value (TLV) for DNOC of 0.2 mg/m<sup>3</sup> TWA (Skin)

NIOSH: The National Institute for Occupational Safety and Health has set a Recommended Exposure Limit (REL) for DNOC of 0.2 mg/m<sup>3</sup> TWA (skin)

EPA: The Environmental Protection Agency has listed DNOC as a hazardous air pollutant. Federal regulations limit the amount of DNOC that factories can release into wastewater. EPA requires industries to report releases or spills of 10 pounds or more.

## Australia

Safe Work Australia: Safe Work Australia has set a time weighted average (TWA) concentration of 0.2 mg/m<sup>3</sup> for DNOC for an 8-hour workday.

## REFERENCES

1. <http://en.wikipedia.org/wiki/Dinitro-ortho-cresol>
2. <http://www.atsdr.cdc.gov/phs/phs.asp?id=1023&tid=218>
3. <http://www.epa.gov/ttn/atw/hlthef/di-creso.html>
4. <http://www.cdc.gov/niosh/npg/npgd0234.html>
5. <http://www.fishersci.com/ecom/servlet/msdsproxy?LBCID=20459331&productName=AC188600010&productDescription=4%2C6-DINITRO-O-CRESOL+98%25+1KG&catNo=AC18860-0010&vendorId=VN00032119&storeId=10652>
6. [https://www.osha.gov/dts/chemicalsampling/data/CH\\_236800.html](https://www.osha.gov/dts/chemicalsampling/data/CH_236800.html)
7. <http://www.safeworkaustralia.gov.au/sites/SWA/about/Publications/Documents/772/Workplace-exposure-standards-airborne-contaminants.pdf>

## Bulletin Board

## Gossip

MAR. 12, 2021

## Fossil fuel cars make 'hundreds of times' more waste than electric cars

2021-03-01

Fossil fuel cars waste hundreds of times more raw material than their battery electric equivalents, according to a study that adds to evidence that the move away from petrol and diesel cars will bring large net environmental benefits.

Only about 30kg of raw material will be lost over the lifecycle of a lithium ion battery used in electric cars once recycling is taken into account, compared with 17,000 litres of oil, according to analysis by Transport & Environment (T&E) seen by the Guardian.

A calculation of the resources for each relative to their weight shows internal combustion engines burn material 300 times greater than that lost once an electric car battery is scrapped. The comparison did not include potential emissions if fossil fuels were burned to create the power for recharging of car batteries.

"Our previous analysis has shown that that electric vehicles emit 64% less CO<sub>2</sub>, including all the different stages like electricity generation and fuel production, but this still hasn't shaken off the argument that electric vehicles use up a large amounts of raw materials," said Lucien Mathieu, a transport analyst at T&E and an author of the report. "Our analysis shows that the raw material needs of EV batteries pale in comparison to the fuel burned by fossil fuel cars, which, unlike batteries cannot be recycled."

In the fossil engine/battery calculations, "we excluded the raw material needed to produce the electricity and the [fossil] fuel because this is contingent on factors such as national electricity mixes and fuel extraction efficiency. In our analysis of upstream energy use [producing the electricity and making the solar panels and turbines used to produce that electricity], we have shown that it would only make a 5% to 10% difference in total energy consumption" for electric vehicles powered by renewable energy.

On other aspects of the two vehicle types, the Brussels-based campaign group said battery electric vehicles were superior to their petrol and diesel counterparts across raw material demand, energy efficiency or cost – as well as eliminating exhaust emissions of carbon dioxide and other harmful gases.

**"Our analysis shows that the raw material needs of EV batteries pale in comparison to the fuel burned by fossil fuel cars, which, unlike batteries cannot be recycled."**

# Bulletin Board

## Gossip

MAR. 12, 2021

The accelerating move to electric vehicles will entail environmental costs. Higher battery production will require more mining of minerals such as lithium, cobalt and nickel.

However, T&E argued that the cost of oil extraction for fuel represents a much greater environmental toll. The report pointed to a “double standard” used when assessing the relative merits of electric and fossil fuel vehicles, which takes the use of oil for granted.

“When it comes to raw materials there is simply no comparison,” said Mathieu. “Over its lifetime, an average fossil-fuel car burns the equivalent of a stack of oil barrels 25 storeys high. If you take into account the recycling of battery materials, only around 30kg of metals would be lost – roughly the size of a football.”

Developments in battery technology will reduce the average amount of lithium, nickel and cobalt required for each car, mitigating some of the increased demand for the materials as well as lowering car prices. At the same time, circular economy regulations requiring higher recycling rates could cut demand further.

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On the overall energy efficiency of vehicles, T&E calculations suggest that battery electric cars will use 58% less energy than a petrol car over its lifetime and emit 64% less carbon dioxide. Emissions associated with electric cars are mainly produced in the energy-intensive manufacturing of batteries, while the vast majority of emissions associated with internal combustion engine cars come from its use.

Some makers of internal combustion engines have argued for the merits of cutting emissions through hybrids that combine batteries with petrol engines, in part because of the emissions associated with producing batteries. However, Aston Martin faced a backlash last year after a report making similar claims – that the large amount of carbon used to make electric car batteries undermined the case for a switch away from petrol – was attributed to a PR company registered to the wife of a director at the UK carmaker.

This article was updated on 2 March 2021 to include an explanation from T&E as to why its battery/engine comparison excluded energy to charge

# Bulletin Board

## Gossip

MAR. 12, 2021

the battery, and its estimate of how much the outcome would have changed had this been included.

[theguardian.com](https://www.theguardian.com), 1 March 2021

<https://www.theguardian.com>

### Cats are too socially inept to be loyal

2021-03-03

In the cat world, there’s a saying that you should keep your humans’ friends close and your humans’ enemies ... just as close. That’s the takeaway of a new study that shows that cats, unlike dogs, will gladly accept food from people who are not nice to their owners.

While dog lovers may rejoice at the chance for another study suggesting dogs are more loyal than cats, the conclusion is not that simple. It might not be that cats are disloyal; rather, they may be too socially clueless to understand when someone is not being nice to their owners, according to the new study, which was published in the February issue of the journal *Animal Behavior and Cognition*.

For the study, a group of researchers from Kyoto University in Japan tested the loyalty of domestic cats by adapting a technique previously used on dogs. The experiment involved a container, 36 domestic cats (13 were house cats and 23 lived in cat cafés) and their owners. **PLAY SOUND**

The researchers set up two groups: the “helpers” and the “non-helpers.” The cats watched as their owners tried in vain to open a container and take out an object. In the helper group, a second person, an actor, helped the owner open the container — in other words, they acted as a friend to the owner. In the non-helper group, the actor refused to help and turned away — making them a foe. To act as a point of comparison, a third person just sat there throughout both conditions, neither helping nor refusing to help.

After the skit, the actor and the neutral person from each trial offered the cat a piece of food, and the experimenters recorded which person the cat took the food from. After four trials, the conclusion was clear: The cats did not care who they took the food from. Previously, the research team showed that dogs undergoing the same experiment avoided people who refused to help their owners.

So does this mean dogs are loyal and cats are selfish?

**The experiment involved a container, 36 domestic cats (13 were house cats and 23 lived in cat cafés) and their owners. **PLAY SOUND****

# Bulletin Board

## Gossip

MAR. 12, 2021

Not quite. "It is conceivable that the cats in this study did not understand the meaning or goal of the owners' behavior," the authors wrote. No studies have investigated if cats can recognize others' goals or intentions from their actions, they wrote. "But even if they did understand the owner's goal or intention, they might have failed to detect the negative intention of the non-helpful actor."

In other words, they may not have realized the other person was not helping their owner open the container.

"We consider that cats might not possess the same social evaluation abilities as dogs, at least in this situation, because unlike the latter, they have not been selected to cooperate with humans," the authors wrote in the study. (Throughout the years, dogs were bred, or artificially "selected" for more cooperative traits.)

Calling cats selfish based on this study would be an "anthropomorphic bias," Ali Boyle, a research fellow in the Kinds of Intelligence project at the University of Cambridge, wrote in *The Conversation*. They're not "furry little humans," but "creatures with their own distinctive ways of thinking," wrote Boyle, who was not involved in the new study.

It's more likely that cats don't understand our social relationships as much as dogs do, because dogs were domesticated much earlier, she wrote. What's more, the ancestors of dogs lived in social packs, whereas cats were solitary hunters, which could mean dogs already had existing social skills that were hyperdeveloped when they were domesticated.

It's also not clear if these findings extend to all house cats. "About two thirds of our subjects were from cat cafés, which makes us cautious about generalizing the results of this study to all domestic cats," the researchers wrote in the study. Though the house cats and the café cats didn't show differences in behavior, they could have a different bond to their owners. Café cats, for example, may spend more time socializing with strangers and may have less individual interactions with their owners than house cats would, they wrote.

Originally published on Live Science.

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

<https://www.livescience.com>

# Bulletin Board

## Gossip

MAR. 12, 2021

### Food waste: Amount thrown away totals 900 million tonnes

2021-03-05

More than 900 million tonnes of food is thrown away every year, according to a global report.

The UN Environment Programme's Food Waste Index revealed that 17% of the food available to consumers - in shops, households and restaurants - goes directly into the bin.

Some 60% of that waste is in the home.

The lockdown appears to have had a surprising impact - at least in the UK - by reducing domestic food waste.

Sustainability charity Wrap, the UN's partner organisation on this report, says people have been planning their shopping and their meals more carefully.

And in an effort to build on that, well-known chefs have been enlisted to inspire less wasteful kitchen habits.

'23 million trucks of food'

The report has highlighted a global problem that is "much bigger than previously estimated," Richard Swannell from Wrap told BBC News.

"The 923 million tonnes of food being wasted each year would fill 23 million 40-tonne trucks. Bumper-to-bumper, enough to circle the Earth seven times."

It is an issue previously considered to be a problem almost exclusive to richer countries - with consumers simply buying more than they could eat - but this research found "substantial" food waste "everywhere it looked".

There are gaps in the findings that could reveal how the scale of the problem varies in low- and high-income countries. The report, for example, could not distinguish between "involuntary" and "voluntary" waste.

"We haven't looked deeper [at this issue] but in low-income countries, the cold chain is not fully assured because of lack of access to energy," Martina Otto from Unep told BBC News.

The data to distinguish between the waste of edible food and inedible parts - like bones and shells - was only available for high-income countries.

**Some 60% of that waste is in the home.**

# Bulletin Board

## Gossip

MAR. 12, 2021

Lower-income countries, Ms Otto pointed out, were likely to be wasting much less edible food.

But the end result, she said, was that the world was “just throwing away all the resources used to make that food”.

Ahead of major global climate and biodiversity summits later this year, Unep executive director Inger Andersen is pushing for countries to commit to combatting waste - halving it by 2030.

“If we want to get serious about tackling climate change, nature and biodiversity loss, and pollution and waste, businesses, governments and citizens around the world have to do their part to reduce food waste,” she said.

Richard Swannell pointed out: “Wasted food is responsible for 8-10% of greenhouse gas emissions, so if food waste was a country, it would be the third-biggest emitter of greenhouse gases on the planet.”

Tips to reduce food waste:

- Plan your portions and buy the right amount: a mug should hold the right amount of uncooked rice for four adults, and you can measure a single portion of spaghetti using a 1p or £1 coin;
- Cool your fridge down: the average UK fridge temperature is almost 7°C. It should be lower than 5°C;
- Understand date labels: a “use by” date is about food safety. If the use by date has passed, you should not eat or serve it, even if it looks and smells okay. If something is getting close to the use by date, you can freeze it. A “best before” date is about quality.

In the UK, the average household could save £700 per year, according to Wrap research, by buying only the food they ate.

The lockdown effect

Where food waste is voluntary, the Covid-19 lockdown appears to have had the surprising effect of revealing precisely how it can be remedied.

According to research by Wrap, planning, careful storage and batch-cooking during the lockdown reduced people’s reported levels of food waste by 22% compared with 2019.

“Being confined to our homes has resulted in an increase in behaviours such as batch cooking and meal planning,” the charity said. “But the

# Bulletin Board

## Gossip

MAR. 12, 2021

latest insights suggest that food waste levels are likely to rise again as we emerge from lockdown.”

In an effort to avoid that, well-known cooks and chefs have lent their names and social media profiles to the campaign against kitchen waste.

British TV cook Nadiya Hussain is working with Wrap and offering tips and leftovers recipes via Instagram. And Italian restaurateur Massimo Bottura, chef patron of Modena eatery Osteria Francescana, which has three Michelin stars, has been appointed Unep goodwill ambassador “in the fight against food waste and loss”.

Throughout the lockdown in Italy, his family produced an online cooking show called Kitchen Quarantine, encouraging people to “see the invisible potential” in every ingredient.

While millions of tonnes of food was thrown away, an estimated 690 million people were affected by hunger in 2019. That number is expected to rise sharply in the wake of the pandemic.

Ms Andersen pointed out that tackling waste “would cut greenhouse gas emissions, slow the destruction of nature through land conversion and pollution, enhance the availability of food and thus reduce hunger and save money at a time of global recession”.

bbc.com, 5 March 2021

<https://www.bbc.com>

### A new effect of red ginseng: suppression of lung cancer metastasis

2021-03-03

Red ginseng, which has long been used as an ingredient in traditional Korean medicine, has recently drawn increased attention as a functional material for its health-promoting effects. The composition and activities of red ginseng vary depending on the processing method, and this has become an active area of research. Recently, a research team in Korea has entered the spotlight as they discovered that red ginseng has inhibitory effects against lung cancer metastasis.

The Korea Institute of Science and Technology (KIST) reported that a joint study conducted by Dr. Jungyeob Ham from the Natural Product Research Center at the KIST Gangneung Institute of Natural Products and Dr. Hyeonseok Ko of Seoul Asan Medical Center revealed that two

**Recently, a research team in Korea has entered the spotlight as they discovered that red ginseng has inhibitory effects against lung cancer metastasis.**

# Bulletin Board

## Gossip

MAR. 12, 2021

components of red ginseng, Rk1 and Rg5, can significantly suppress lung cancer metastasis.

Dr. Ham of KIST developed a new microwave processing method for red ginseng that is based on the same principle as a microwave oven, which when compared to existing processing methods, such as repetitive steaming and drying, increases the concentration of the three main active components, Rg3, Rk1, and Rg5, more than 20 times. The research team previously demonstrated that red ginseng produced by this microwave processing method, which they have called KMxG, is effective against prostate, cervical, and skin cancers, and has protective effects against drug-induced kidney damage. This technology was transferred to Ponin Bio Co., Ltd. in 2020 for a technology fee of KRW 800 million and is currently being developed for commercialization.

Unlike normal cells, which die when separated from their original tissue, cancer cells can spread to other tissues where they invade and grow, in a process called metastasis. TGF- $\beta$ 1, a cytokine protein that functions as a signaling substance in the body, induces lung cancer metastasis and promotes the development of stem cell-like properties in cancer cells. The KIST research team treated lung cancer cells with Rk1 and Rg5, the main components of KMxG red ginseng and showed that both components effectively inhibited various processes related to cancer metastasis induced by TGF- $\beta$ 1.

“Although components of red ginseng previously have been shown to kill cancer cells, this study proved that these components of red ginseng have other anti-cancer effects and can inhibit lung cancer metastasis. This provides scientific evidence that may lead to the future development of anti-cancer drugs derived from natural products,” remarked Dr. Ham. He added, “Because we can control the active ingredient contents of red ginseng by using microwave processing methods like the one that produced KMxG, it may be possible to develop customized functional materials for various diseases.”

eurekalert.org, 3 March 2021

<https://www.eurekalert.org>

# Bulletin Board

## Gossip

MAR. 12, 2021

### Subtle quantum phenomenon found to alter chemical reactivity for the first time

2021-03-04

A new frontier has been discovered in how quantum phenomena control chemical reactivity. By colliding beams of two different reactants, a Chinese team spanning three universities has shown that the outcome can only be explained by interactions between electron spin and orbital angular momentum. This is the first time that electronic angular momentum has been found to affect such reactions, explains Xueming Yang from South University of Science and Technology in Shenzhen. The finding is ‘very special’, adds his colleague Zhigang Sun from the Dalian Institute of Chemical Physics.

The crossed-beam approach the team uses is common in experiments seeking to understand the quantum states involved in reactions, explains Sun. In their reaction, one of the beams consisted of fluorine atoms. The other beam, crossing the first at a right angle, contained hydrogen-deuterium molecules. When the reactants collide, the fluorine atom displaces the deuterium atom, forming a hydrogen fluoride molecule, with the products scattering in various directions.

The transition state between the starting materials and products lasts for less than 10-12 seconds, a picosecond, or quadrillionth of a second. But the crossed beam experiments provide windows on that fleeting world. Varying the collision energy between atoms creates sharp variations, or resonances, in the probability of products forming at a particular scattering angle and internal energy. By measuring that information, researchers can extract information about the quantum mechanical energy level structure of the transition state.

To get those valuable details, researchers typically shine lasers into the collision zone of their crossed-beam reactions. These both detect where the products go and gain information about their electronic structure spectroscopically. Until recently this laser ionisation approach could detect the product molecules’ rotational energy level, but not their electronic angular momentum. Electronic angular momentum energy is much smaller than the rotational energy of a diatomic molecule, Wang says. ‘Its influence on a chemical reaction is therefore subtle and difficult to detect,’ says team member Xingan Wang from Hefei National Laboratory for Physical Sciences at the Microscale.

Near the threshold

**The finding is ‘very special’, adds his colleague Zhigang Sun from the Dalian Institute of Chemical Physics.**

## Bulletin Board

## Gossip

MAR. 12, 2021

However Wang, Yang and Sun's team has developed a more sensitive technique called near-threshold ionisation. 'The key experimental result in the current work is [detected] with high angular resolution,' comments Wang. 'This was not available previously. If laser energy is above the ionisation limit, momentum can transfer to the atom and adversely affect the measurements, he explains. Near-threshold ionisation avoids this. 'By accurately tuning the photon energy during the detection, we can be sure that the products receive just enough photon energy to be ionised,' Wang says.

In one particular resonance state, the researchers found a horseshoe-shaped scattering pattern where hydrogen fluoride molecules were in high rotational energy states. The team's theoretical analysis revealed that the horseshoe pattern had largely resulted from quantum interference between electron spin and orbital angular momentum.

Francisco Javier Aoiz from Complutense University of Madrid calls the study 'very beautiful work that represents the state-of-the-art in molecular reaction dynamics.' 'The experimental results are simply stunning,' he adds. 'They have achieved a resolution that 20 years ago would have been deemed as unattainable. They have determined quantum-state-resolved angular distributions in the whole range of scattering angles with an unprecedented accuracy.' He says the effect detected is subtle but reveals 'interplay of several coupled potential energy surfaces' that manifests in different ways in other chemical reactions.

While the work provides a fundamental revelation about the influences on chemical transition states, the team now needs to evaluate its full significance, notes Wang. 'We are planning to further investigate the role of the electronic angular momentum in a more general chemical reaction,' he says.

chemistryworld.com, 4 March 2021

<https://www.chemistryworld.com>

### Meet the swirloon, a new kind of matter that bends the law of physics

2021-03-02

Fish school, insects swarm and birds fly in murmurations. Now, new research finds that on the most basic level, this kind of group behavior forms a new kind of active matter, called a swirlonic state.

## Bulletin Board

## Gossip

MAR. 12, 2021

Physical laws such as Newton's second law of motion — which states that as a force applied to an object increases, its acceleration increases, and that as the object's mass increases, its acceleration decreases — apply to passive, nonliving matter, ranging from atoms to planets. But much of the matter in the world is active matter and moves under its own, self-directed, force, said Nikolai Brilliantov, a mathematician at Skolkovo Institute of Science and Technology in Russia and the University of Leicester in England. Living things as diverse as bacteria, birds and humans can interact with the forces upon them. There are examples of non-living active matter, too. Nanoparticles known as "Janus particles," are made up of two sides with different chemical properties. The interactions between the two sides create self-propelled movement.

To explore active matter, Brilliantov and his colleagues used a computer to simulate particles that could self-propel. These particles weren't consciously interacting with the environment, Brilliantov told Live Science. Rather, they were more akin to simple bacteria or nanoparticles with internal sources of energy, but without information-processing abilities. **PLAY SOUND**

The first surprise was that this active matter behaves very differently than passive matter. Different states of passive matter can coexist, Brilliantov said. For example, a glass of liquid water can gradually evaporate into a gaseous state while still leaving liquid water behind. The active matter, by contrast, didn't coexist in different phases; it was all solid, all liquid or all gas.

The particles also grouped together as large conglomerates, or quasi-particles, which milled together in a circular pattern around a central void, kind of like a swirl of schooling sardines. The researchers dubbed these particle conglomerates "swirlons," and named the new state of matter they formed a "swirlonic state."

In this swirlonic state, the particles displayed bizarre behavior. For example, they violated Newton's second law: When a force was applied to them, they did not accelerate.

"[They] just move with a constant velocity, which is absolutely surprising," Brilliantov said.

The simulations were basic, and experimental work with real-world active matter is an important next step, he said. Brilliantov and his colleagues also plan to do more complex simulations using active-matter particles with information-processing abilities. These will more closely resemble

# Bulletin Board

## Gossip

MAR. 12, 2021

insects and animals and help to reveal the physical laws governing schooling, swarming and flocking. Ultimately the goal is to create self-assembling materials out of active matter, Brilliantov said, which makes it important to understand the phases of this kind of matter.

"It's quite important that we see the nature of active matter" is much richer than that of passive matter, Brilliantov said.

The research was detailed in October 2020 in the journal *Scientific Reports*.

Originally published on Live Science.

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

<https://www.livescience.com>

### Rare Australian bee rediscovered after nearly a century

2021-03-02

An extremely rare species of bee that hasn't been seen for nearly a century and was thought to be extinct has been rediscovered by a lone researcher in Australia.

This rare "masked" bee, known as *Pharohylaeus lactiferus*, is native to Australia and is the only species in the genus *Pharohylaeus*. It is similar in size to the invasive European honeybee (*Apis mellifera*). Only six individuals have been previously identified in Australia and the last one was reported in 1923.

But the bee was recently rediscovered by James Dorey, a doctoral candidate at Flinders University, while completing fieldwork in the state of Queensland. After the chance rediscovery, Dorey conducted a larger survey of Queensland and New South Wales dedicated to searching for *P. lactiferus*.

"I never really expected to find any," Dorey told Live Science. "But we have caught many times more bees now than we did back then."

His research on the bees suggests that deforestation and forest fires could be putting them at risk of extinction, for good this time.

Searching for bees

The rediscovery of *P. lactiferus* was a lucky accident for Dorey.

"Knowing that *P. lactiferus* hadn't been found for so long meant that I was keeping an eye open for it as I sampled my way up the coast," Dorey said.

# Bulletin Board

## Gossip

MAR. 12, 2021

"Once I managed to find the first specimen I had a place to start and the opportunity to look for more."

After the discovery Dorey spent five months surveying 245 sites across Queensland and New South Wales in search for more of the masked bees. Dorey focused his efforts on certain flowering plants that were similar to those where he found the first individual. The sampling involved a combination of both watching flowers to see if the bees visited them and "general sweeps" with a butterfly net above the flowers.

The survey revealed three geographically isolated populations of the masked bees across Australia's eastern coast. Each population lives in patches of tropical and subtropical rainforest with a specific vegetation type. Dorey thinks that the bees are particularly dependent on firewheel trees (*Stenocarpus sinuatus*) and Illawarra flame trees (*Brachychiton acerifolius*).

Under threat

The survey has identified more individuals of *P. lactiferus* than ever before. But due to poor historic records there is no way of knowing if the masked bee populations have increased or decreased over time, according to Dorey.

Although the bees' may live in isolated populations because they strongly prefer certain habitats, Dorey also suspects that deforestation and increasingly severe and numerous wildfires could also be playing a role in their isolation.

"Where these bees have been found, that rainforest type has undergone habitat destruction and fragmentation," Dorey said. "This means that there is less of this habitat available," and that makes it "harder for [the bees] to move between what's left."

Unfortunately, rising temperatures caused by climate change will only worsen wildfires, and deforestation is only continuing, which means "these potential threats are likely to get worse," Dorey said.

"Smaller, and lower-quality fragments might make it more likely that *P. lactiferus* will go extinct in each fragment, and less likely that it will be able to recolonize from another," Dorey said.

Therefore, protecting these habitat fragments is key to their survival.

However, protecting species is impossible without tracking the bees' numbers as well as changes in their habitats.

## Bulletin Board

## Gossip

MAR. 12, 2021

“Without it we have no idea what’s going on in ecosystems,” Dorey said. “If we did not go and look, then species declines would certainly go unnoticed and the protection of species would be impossible.”

The study was published online Feb. 25 in the Journal of Hymenoptera Research.

Originally published on Live Science.

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

<https://www.livescience.com>

### Cuttlefish show self-control, pass ‘marshmallow test’

2021-03-04

Cuttlefish can pass the “marshmallow test” — the famous psychological test of self-control.

In this case, the cephalopods were willing to forgo meals when they knew that waiting meant they would be rewarded with more delicious treats, according to a new study. That makes them the first known invertebrates to show the ability to exert self-control.

The common cuttlefish (*Sepia officinalis*) — relatives of squids and octopuses — are sneaky hunters and impressive camouflagers, with the ability to quickly disappear into any environment. They are also scarily smart; studies previously showed that they have a good memory, can learn the value of different types of prey and can use past experience to help them predict where to find food.

But prior to this study, it was unclear whether these creatures could also delay gratification. **PLAY SOUND**

“Self-control is thought to be the cornerstone of intelligence, as it is an important prerequisite for complex decision-making and planning for the future,” said lead author Alex Schnell, a research associate in the Department of Psychology at the University of Cambridge. Not all animals share this trait, and it was previously thought that the ones that do, such as great apes, corvids and parrots, have long and social lives.

To see if a cephalopod should join the ranks, Schnell and her team adapted the famous “marshmallow test” so that it appealed to cuttlefish. In the 1960s, Walter Mischel led an experiment at Stanford University to test how much self-control children have when presented with a preferred treat such as a marshmallow (or other treats such as cookies and pretzels)

## Bulletin Board

## Gossip

MAR. 12, 2021

and two options: either eat the one marshmallow now or wait for 15 to 20 minutes and get rewarded with two marshmallows.

In the current study, Schnell’s team swapped out marshmallows for seafood munchies, after figuring out what six individual 9-month-old (not yet fully adult) cuttlefish preferred to eat. It turned out, all of them preferred live grass shrimp the most, followed by king prawn, with the Asian shore crab coming in last of the three.

They then set up a two-chamber apparatus with transparent sliding drawers. Behind one drawer, they placed a preferred meal (such as live grass shrimp) and behind the other, they placed a less preferred meal (such as Asian shore crab). The doors had symbols on them that indicated whether it would open with a delay (a triangle) or open immediately (a circle), which the cuttlefish learned to recognize.

The drawer with the less preferred meal always opened to the cuttlefish immediately, but the other drawer opened after a delay. In the control condition, the door with the preferred snack didn’t open at all (a square). When the cuttlefish approached one chamber, the researchers immediately removed the snack in the other.

A bit of a mystery

The cuttlefish indeed chose to delay gratification to score a more delicious meal if they knew the door would open after a delay; they were able to delay grabbing their snack for anywhere between 50 to 130 seconds. During this time, they generally sat at the bottom of the tank looking at the two rewards, Schnell told Live Science in an email.

Sometimes, they would even turn away from the immediate (less preferred but currently available) option “as if to distract themselves from the temptation of the immediate reward,” she said. This same distraction technique was previously observed in humans, chimpanzees, jays, parrots and dogs, she said.

“Why cuttlefish evolved the ability to exert self-control is a bit of a mystery,” Schnell said. “This finding is an extreme example of convergent evolution because cuttlefish have significantly different evolutionary histories from the more commonly studied apes, corvids and parrots, and yet they share the same cognitive feature.” (Convergent evolution occurs when different species evolve similar traits independently of one another.)

“Cuttlefish can tolerate delays to obtain the food of higher quality comparable to that of some large-brained vertebrates,” the authors

# Bulletin Board

## Gossip

MAR. 12, 2021

wrote in the study. Those include great apes, parrots and corvids. But the benefits of self-control for such social and long-lived animals “are obvious,” Schnell said.

If these animals resist temptation now, they may have better outcomes in the future and live a longer life. For example, these animals may wait for others to eat to strengthen social bonds or forego hunting and foraging to give themselves time to craft tools in order to optimize hunting and foraging in the future, she said.

The benefits for cuttlefish are less obvious. “Cuttlefish are not long-lived, not social and do not manufacture or build tools,” Schnell said.

The researchers hypothesize that the cuttlefish evolved self-control as a byproduct of an unrelated trait: camouflage. To avoid being detected by predators, cuttlefish need to spend long periods of their day in hiding, taking only brief breaks to forage. “Thus, perhaps self-control evolved to optimize their foraging behavior and reduce their predator exposure,” she added.

The researchers also tested whether the degree of self-control in cuttlefish was linked to higher intelligence, or in this case, the ability of the cuttlefish to learn. To do this, they trained the cuttlefish to associate the reward with various stimuli; cuttlefish that exerted more self-control (waited longer to get their food) had a better ability to learn, according to the findings.

To link self-control to intelligence researchers need to study how the cuttlefish perform in other cognitive tests such as spatial memory and object permanence, which means an understanding that an object continues to exist regardless of whether you can see it, Schnell said.

The findings were published Tuesday (March 2) in the journal *Proceedings of the Royal Society B*.

Originally published on Live Science.

[livescience.com](https://livescience.com), 4 march 2021

<https://www.livescience.com>

# Bulletin Board

## Gossip

MAR. 12, 2021

### People who have had COVID-19 might need only one shot of a coronavirus vaccine

2021-03-03

People who have already had COVID-19 — even if they didn’t show symptoms — may be able to get away with just a single dose of a two-dose coronavirus vaccine, a study of health care workers suggests.

Researchers tested for antibodies in the blood of 59 health care workers who got vaccinated with either the Pfizer or Moderna vaccines. Some of the volunteers had COVID-19 eight to nine months before vaccination.

“Their bodies remembered it, no problem,” and reacted very quickly to the vaccine, says Mohammad Sajadi, an infectious disease doctor at the Institute of Human Virology at the University of Maryland School of Medicine in Baltimore. After the first vaccine dose, antibody levels quickly shot up in people who previously had COVID-19 either with or without symptoms to more than 500 times the levels seen in people who were never infected.

Those results, published March 1 in *JAMA*, suggest that people who have had COVID-19 could get one shot or be moved to the end of the line for vaccinations. An estimated 9 percent of people in the United States have had confirmed cases of COVID-19. Limiting those people to one dose of vaccine could free up 4 to 5 percent of vaccine doses, Sajadi says.

“Immunologically it makes sense,” he says. “With the ongoing pandemic and vaccine shortages, it makes sense, too. The cost of inaction is just too great” not to spare vaccine doses where possible.

[sciencenews.org](https://www.sciencenews.org), 3 March 2021

<https://www.sciencenews.org>

### The price of working from home? A 7% rise in housing costs, report reveals

2021-03-02

Americans who are working remotely could be losing out financially by carrying out their roles from home rather than at their usual place of work. That’s the perhaps surprising finding of a new report from the National Bureau of Economic Research (NBER) which reveals that employees who work from home spend on average 7% more on housing costs than those who stay in the office.

**Indeed, in 2017 a report from FlexJobs revealed that only around 3% of the US workforce regularly worked from home...**

# Bulletin Board

## Gossip

MAR. 12, 2021

### Hidden housing costs

The figures show that between 2013 and 2017, households with at least one adult working from home spent between 8.4% and 9.8% more on housing costs than non-remote households, largely the result of higher mortgage costs and property taxes. Yet a similar jump was true for renters, who spent between 6.5% and 7.4% more than their office-based peers.

The study suggests that this is due to the fact that remote workers typically have larger houses with a higher cost per room, with the need for extra space becoming apparent to anyone who's been catapulted into remote working in the last 12 months.

And, given that the figures were compiled in a pre-COVID era, it isn't difficult to assume that even more workers could now be feeling the effects of higher housing costs. Indeed, in 2017 a report from FlexJobs revealed that only around 3% of the US workforce regularly worked from home; by May last year, however, this proportion had exploded, with the NBER reporting that half of respondents were doing so, including 35% who'd switched to remote working as a direct result of the pandemic.

This isn't a trend that's likely to slow down any time soon, particularly given the relative ease with which many employers and employees alike have adjusted to this new way of working. Yet this also means that a growing number of Americans are likely to be impacted by rising housing costs, be it through moving to a bigger property - as over a quarter of remote workers have said they'd like to do - or perhaps by renovating their current home if they want to finance a dedicated home office space. But there are ways you can mitigate some of those costs, with the considerations differing depending on whether you're relocating or renovating.

### Should you move or remodel?

The first thing to do is be realistic about what you can afford, particularly if you're considering relocating. Moving to the suburbs may be an option if you don't need to worry about the commute, but costs are rising here too, and knowing how much mortgage you can afford will be your very first step in deciding whether it's viable.

Firing up your personal finance software can be hugely beneficial when working out your level of affordability, and remember too that if you're moving to a bigger, more expensive property, it follows that homeowners

# Bulletin Board

## Gossip

MAR. 12, 2021

insurance can become similarly more expensive, so always keep these kinds of costs in mind when contemplating your next steps.

If staying in your current home, but switching it around or adding to it, is more of a viable option for the time being, you'll likely want to know how to finance a home renovation. This will usually depend on whether it'll be a simple update to a few rooms or a full remodeling project, complete with extension for the home office - the former might perhaps only need a small personal loan, while the latter could require something at the more extreme end of the scale, such as refinancing your mortgage or securing a home equity loan.

### Remember the benefits

The NBER study didn't delve into the additional expenses of home-working either, such as the cost of new equipment required to create the perfect home office and the endless supply of coffee that employers will no longer be paying for, yet there are undoubtedly some perks to this way of working, too.

Most will save on travel costs to the office, and are unlikely to miss the time spent stuck in traffic getting there. And while the home office tax deduction is not as wide ranging as it once was, if you're self-employed, an independent contractor or gig worker working from home, it could still benefit you, when loading up your tax software.

What you can't really put a price to, however, but what remains valuable about working remotely nonetheless, is the flexibility to quickly step away from your desk and just pop that nearly-ready meal into the oven, or welcome repair workers without needing to take the day off - these are little extras that can make a lot of difference as well.

[toptenreviews.com](https://www.toptenreviews.com), 2 March 2021

<https://www.toptenreviews.com>

# Bulletin Board

## Curiosities

MAR. 12, 2021

### Volvo plans to sell only electric cars by 2030

2021-03-02

Volvo Cars one-upped larger rivals like General Motors and added momentum to the movement toward electric vehicles on Tuesday by saying it would convert its entire lineup to battery power by 2030, no longer selling cars with internal combustion engines.

The declaration by the Swedish carmaker is the latest attempt by a traditional auto company to break with its fossil fuels past. It is also one of the most ambitious proposals and ratchets up the pressure on others to follow suit.

The auto industry has been moving toward electrification for years, but the shift has taken on new urgency in recent months. President Biden's election, along with his commitment to fight climate change, has raised expectations that the United States will offer the kind of incentives that helped make electric cars the fastest-growing segment of the European market last year.

Where once automakers bragged about horsepower and acceleration, now they are competing to be the greenest. G.M. said in January that it would go all electric by 2035. Ford said last month that it would sell only battery-powered cars in Europe starting in 2030, and the maker of Jaguar luxury cars made a similar promise.

Gasoline- and diesel-powered cars still account for the vast majority of sales, but in Europe sales of cars powered solely by batteries more than doubled last year, to about 730,000 vehicles, according to Schmidt Automotive Research. Sales of conventional autos slumped.

"If you want to be in the game, you have to transform fast," Hakan Samuelsson, the chief executive of Volvo, said in an interview. "Otherwise, you get stuck in a shrinking segment."

BMW, Audi and Mercedes-Benz, German carmakers that target the same affluent buyers as Volvo, have not yet set expiration dates for internal combustion models. They may be fearful of unsettling buyers of gasoline vehicles.

But they are no longer investing heavily in internal combustion engines and are rushing to produce vehicles that can compete with Tesla's electric models. Volkswagen will begin selling its ID.4 electric S.U.V. in the United States this year for about \$40,000, before subtracting a federal tax credit of up to \$7,500.

**It is also one of the most ambitious proposals and ratchets up the pressure on others to follow suit.**

# Bulletin Board

## Curiosities

MAR. 12, 2021

"They are all thinking pure electric," said Ferdinand Dudenhöffer, a longtime industry analyst. "The only thing they are not doing is announcing a date."

Volvo, owned by Geely Holding of China, has been ahead of larger rivals in converting to electric power. All the models it sells in Europe are either hybrids or run solely on batteries. But some of the Volvos are so-called mild hybrids, which have an electric motor that assists the gasoline engine but are not capable of running solely on battery power. Hybrids have better fuel economy than conventional vehicles, but they may not be much better for the climate or for urban air quality if drivers do not use the electric abilities.

By 2030, Volvo will "phase out any car in its global portfolio with an internal combustion engine, including hybrids," the company said in its statement on Tuesday.

The electrification strategy reflects Volvo's ties to China. Geely Holding is the largest shareholder in Geely Auto, which said last week that it would cooperate more closely with Volvo on electric vehicle technology. That will help spread the costs of the technology, and help Geely Auto catch up with Chinese rivals like Nio.

In another break from the practice of traditional carmakers, Volvo's electric models will be sold exclusively online. Dealers will still offer test drives and deliver vehicles, Mr. Samuelsson said, but ordering will be done on the internet and prices will be fixed. In other words, no more haggling.

Volvo acknowledged that its push toward battery-powered cars was a response, in part, to pressure from governments, many of which have announced bans on internal combustion engines in coming years. In Europe many municipalities are planning to ban gasoline and diesel vehicles from city centers because of concerns about air quality.

The decision was based "on the expectation that legislation as well as a rapid expansion of accessible high-quality charging infrastructure will accelerate consumer acceptance of fully electric cars," Volvo said.

The decision to go all electric is still a leap of faith for Volvo, which has only one battery-powered car on the market now, a version of its XC40 S.U.V. On Tuesday, Volvo unveiled a second model, the C40 crossover, which the company said was its first vehicle designed from the ground up to run on batteries. (Volvo also owns Polestar, which produces electric cars at a Geely Auto factory in China.)

# Bulletin Board

## Curiosities

MAR. 12, 2021

The C40 will be able to travel 210 miles on a charge, Volvo said, a somewhat shorter range than the Tesla Model 3.

Mr. Samuelsson said the company had more electric models in development. "We will have the cars," he said. "It's more a challenge, will our customers follow us in this transition? I would say yes. Electrification is coming faster and faster."

Many elements of electric vehicle technology are still in flux. Battery science is evolving quickly, and it is unclear what combination of materials will prevail. Electric vehicles are not profitable for most carmakers, largely because of the high cost of batteries. Charging stations are still few and far between in many parts of the world.

"There are some leaps of faith and some bets that need to be made for this road to be viable," Henrik Green, the chief technology officer of Volvo, said in an interview Tuesday. But he noted that internal combustion engines were not very profitable, either, because many car factories are operating far below potential.

"The combustion road is much less viable to bet on for the next 10 years," Mr. Green said.

[nytimes.com](https://www.nytimes.com), 2 March 2021

<https://www.nytimes.com>

### Link found between cannabis and rebound headaches after migraine

2021-03-02

People with chronic migraines who use cannabis products are much more likely to suffer from "rebound headaches" than those who don't use the drugs, a preliminary study suggests.

However, though a link has been uncovered, it's still unclear whether cannabis directly triggers the rebound headaches, the study authors told Live Science. The study also didn't specify what types of cannabis products the patients used, so it's unknown whether certain products show a greater correlation to rebound headaches than others.

A rebound headache, also known as a medication-overuse headache (MOH), happens when a person who already has a headache disorder, such as chronic migraine, either develops a new kind of headache or their existing headaches significantly worsen over time because they are

# Bulletin Board

## Curiosities

MAR. 12, 2021

taking headache medication too frequently, according to the International Classification of Headache Disorders (ICHD 3).

A formal diagnosis of rebound headaches means that a person has regularly overused one or more drugs to treat their headaches for more than three months. That usually means taking pain-relieving or antimigraine medications more than two or three days a week, according to Harvard Health. In addition, a diagnosed person will have experienced headaches on 15 or more days each month. The rebound headaches usually resolve if patients stop overusing the medications.

AY SOUND

These headaches affect about 1% to 3% of people in the general population and nearly one-third of the patients who seek treatment for headaches at specialized clinics, such as the Stanford Headache Center, study author Dr. Niushen Zhang, a clinical assistant professor and director of the Headache Fellowship Program at Stanford University School of Medicine, told Live Science in an email.

Now, in their new study, Zhang and her colleagues found that people with chronic migraines appear six times more likely to experience rebound headaches if they use cannabis, as compared with migraine patients who don't use the drug. The scientists will present the unpublished research at the American Academy of Neurology's 73rd Annual Meeting, to be held virtually in April.

"This study shows that there is some kind of association between cannabis use and medication-overuse headache in people with chronic migraine," Zhang said.

However, the research is still in its early days, and "it is unclear at this time whether patients are using cannabis to treat medication-overuse headache or if cannabis is contributing to the development [of] medication-overuse headache, or both," Zhang said. Future studies will be needed to determine whether cannabis contributes to the emergence of rebound headaches, and if so, what that means for those with chronic migraines, she said.

For now, "it is too early to provide any clinical recommendations based on the current findings," Zhang added.

Zhang and her colleagues launched their study after noticing that a number of their patients with both chronic migraines and MOH also used cannabis products, she said. As there is very little research on cannabis

### The rebound headaches usually resolve if patients stop overusing the medications.

# Bulletin Board

## Curiosities

MAR. 12, 2021

use and these headache disorders, the team decided to explore the association further.

“Our study is the first of its kind to assess the risk of medication-overuse headache in chronic migraine patients who use cannabis,” Zhang said.

The team pulled data from the Stanford Research Repository Cohort Discovery Tool, collecting information on chronic migraine patients treated between 2015 and 2019. They included 368 adults who had experienced chronic migraine for at least a year; 150 reported using cannabis products, and 218 did not use any.

The team then assessed which patients had been diagnosed with MOH, taking other variables into account, such as how often they got migraines, how long they'd been using cannabis, when they got diagnosed with MOH and what other medications they took for headaches.

They found that 212 patients had MOH, and that patients who reported cannabis use were far more likely to be diagnosed with the disorder. There was also a significant link between cannabis use, opioid use and rebound headaches, they found. “Some of the patients in the study who were using cannabis were also taking, or had a history of taking, opioids,” Zhang said.

Again, future studies will need to investigate if and how these drugs raise the risk of rebound headaches, as well as what happens when people take them simultaneously.

The cannabinoids in cannabis products bind to receptors in the body that regulate the perception of pain, and there is evidence that cannabis products can help alleviate certain types of chronic pain, Live Science previously reported. That said, since this new study reveals a potential link between the drugs and rebound headaches, more research will be needed to see whether cannabis sets migraine patients up for worse headaches, Zhang said.

Again, for now, it's too early to say for sure.

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

<https://www.livescience.com>

# Bulletin Board

## Curiosities

MAR. 12, 2021

### Sesaminol: Parkinson's disease's surprise medicine

2021-03-03

Sesame seed oil, used by many for its nutty aroma and high burn-point, is made by extracting the fatty oils from sesame seeds, with the empty shells thrown out as waste. In a literal instantiation of the age-old adage “one man's trash is another man's treasure”, researchers discovered that a chemical called sesaminol, abundant in this waste, has protective effects against Parkinson's disease.

“Currently there is no preventive medicine for Parkinson's disease”, states OCU Associate Professor Akiko Kojima-Yuasa, “we only have coping treatments”. Associate Professor Kojima-Yuasa led her research group through a series of experiments to understand the effects of sesaminol on in vitro and in vivo Parkinson's disease models.

Parkinson's disease is caused when certain neurons in the brain involved with movement break down or die due in part to a situation called oxidative stress - neurons in the brain come under extreme pressure from an imbalance between antioxidants and reactive oxygen species (ROS). The team found in cell-based in vitro experiments that sesaminol protected against neuronal damage by promoting the translocation of Nrf2, a protein involved in the response to oxidative stress, and by reducing the production of intracellular ROS.

In vivo experiments brought Associate Professor Kojima-Yuasa's team equally promising results. The impairment of movement due to Parkinson's disease is the result of damaged neurons producing less dopamine than is naturally needed. The team showed that mice with Parkinson's disease models show this lack of dopamine production. However, after feeding the mice a diet containing sesaminol for 36 days, the research team saw an increase in dopamine levels. Alongside this, a rotarod performance test revealed a significant increase in motor performance and intestinal motor function.

With the first-ever medicine for Parkinson's disease potentially being the naturally occurring food ingredient sesaminol, and this ingredient being found in the naturally occurring waste of the sesame seed industry, Associate Professor Kojima-Yuasa and her team are ready to take their work to the clinical trial phase and connect the consumption/production

**“Currently there is no preventive medicine for Parkinson's disease”, states OCU Associate Professor Akiko Kojima-Yuasa, “we only have coping treatments”.**

## Bulletin Board

## Curiosities

MAR. 12, 2021

chain in a way that, as she puts it, “prevents diseases with natural foods to greatly promote societal health.”

eurekaalert.org, 3 March 2021

<https://www.eurekaalert.org>

### The genes behind the sexiest birds on the planet

2021-03-03

For a glimpse of the power of sexual selection, the dance of the golden-collared manakin is hard to beat. Each June in the rainforests of Panama, the sparrow-size male birds gather to fluff their brilliant yellow throats, lift their wings, and clap them together in rapid fire, up to 60 times a second. When a female favors a male with her attention, he follows up with acrobatic leaps, more wing snaps, and perhaps a split-second, twisting backflip. “If manakins were human, they would be among the greatest artists, athletes, and socialites in our society,” says Ignacio Moore, an integrative organismal biologist at Virginia Polytechnic Institute and State University.

As biologists have understood since Charles Darwin, such exhibitionism evolves when females choose to mate with males that have the most extravagant appearances and displays—a proxy for fitness. And now, by studying the genomes of the golden-collared manakin (*Manacus vitellinus*) and its relatives, researchers are exploring the genes that drive these elaborate behaviors and traits. Last month at the virtual meeting of the Society for Integrative and Comparative Biology, Moore and other researchers introduced four manakin genomes, adding to two already published, and singled out genes at work in the birds’ muscles and brains that may make the displays possible.

The work offers “a better understanding of why manakins do all the amazing things that they do,” says Emily DuVal, a behavioral ecologist at Florida State University. Over the past decade, researchers have learned much about how natural selection affects genomes. “In contrast, we know very little about the underlying basis of sexually selected traits,” says Christopher Balakrishnan, an evolutionary biologist at East Carolina University (ECU). By mapping traits and genes onto the manakin family tree, researchers are beginning to trace the stepwise genetic changes that led to the most elaborate displays and determine whether sexual selection works differently from natural selection.

**When a female favors a male with her attention, he follows up with acrobatic leaps, more wing snaps, and perhaps a split-second, twisting backflip.**

## Bulletin Board

## Curiosities

MAR. 12, 2021

Other species—birds of paradise and bowerbirds, in particular—also mount impressive sexual displays. But manakins have a greater variety of such traits and, being more abundant and more accessible, are easier to study in-depth. We can “assess the genomic basis for these behaviors in a way that isn’t possible for many other complex behavioral traits in vertebrates,” says Morgan Wirthlin, an evolutionary neurobiologist at Carnegie Mellon University.

As Balakrishnan and his colleagues reported at the meeting, a sweet tooth—or beak—may have set the stage for sexual selection in manakins. Their ancestors are known to have switched their diet from insects to fruit, and researchers suspected the change to a more available and abundant food source gave males extra energy for procuring mates.

By comparing genomes of manakin relatives that continue to eat insects with those of fruit-eating manakins, Balakrishnan, Maude Baldwin from the Max Planck Institute for Ornithology, and colleagues found evidence that fruit eating and elaborate male displays evolved in steps. The researchers learned that the genes coding for a savory taste receptor began to change even before manakins became fruit eaters. By the time the saffron-crested tyrant-manakin (*Neopelma chrysocephalum*) evolved, Baldwin reported at the meeting, the receptor had become sensitive to the sweetness of ripe fruits—a trait rare among birds. That species courts with simple hops—partway to the elaborate displays of the fruit-eating species that evolved later.

Wirthlin and others explored the DNA that changed to make those behaviors possible. In her analysis of five manakin genomes, she focused on ultraconserved noncoding elements, segments of DNA that have stayed almost exactly the same across animals ranging from chickens to humans and are thought to play a crucial role in regulating other genes. Given this conservation, she thought they’d be a good place to look for possible fingerprints of sexual selection.

In the manakin genomes, 57 elements showed slight differences from the matching sequences in other species; those changes might alter the activity of the genes they regulate. Some of those elements are clustered around genes for muscle proteins and hormone receptors and some are near genes expressed in the brain, including two, *TLE4* and *MEIS2*, active in a region needed for fast visual processing. Both genes are less active in manakins than in zebra finches, Wirthlin reported—a change that might help male manakins cope with the visual demands of their frenetic dances.

# Bulletin Board

## Curiosities

MAR. 12, 2021

Matthew Fuxjager, an integrative biologist at Brown University, is excited about Wirthlin's finding that evolution may have revved up the activity of genes for the birds' hormone receptors. The high-speed wing clapping in some species requires extra fast and powerful wing pectoral muscles—which are highly sensitive to the male hormone androgen. "Androgens are what dial up the speed," by changing the activity of muscle performance genes, Fuxjager says.

At the meeting, Balakrishnan reported pinpointing other genes that may also have supercharged those crucial muscles. His genomic analysis suggested that the activity of genes involved in muscle metabolism and growth changed early in manakin evolution, yielding more powerful muscles. He has not looked in females, but he and Fuxjager think the demands of flight, not mating, may have driven those early changes. Then, as sexual selection began to act on later-evolving species, changes in the androgen receptors and other signaling paths made the flight muscles in males capable of the very fast movements needed for the courtship displays. (Other research shows female muscles are not as sensitive to androgens.)

The manakins' performance involves more than sound and movement—in some species it's a social act as well, coordinated among as many as 20 males. In all vertebrates, a network of brain "nuclei"—clusters of similar nerve cells—helps control social behavior, and studies presented at the meeting show the pattern of gene activity in those nuclei varies with testosterone levels. The work, by evolutionary biologist Peri Bolton at ECU and ecologists Brent Horton at Millersville University and Brant Ryder at the Smithsonian National Zoological Park, suggests changes in androgen receptors could have aided the birds' social sophistication as well as their athleticism.

Dazzling as the manakins' displays are, researchers are just as awed by their intricate genetic underpinnings. "Our studies are teaching us that beauty is more than skin deep," Moore says.

sciencemag.org, 3 March 2021

<https://www.sciencemag.org>

# Bulletin Board

## Curiosities

MAR. 12, 2021

### **DNA databases are too white, so genetics doesn't help everyone. How do we fix that?**

2021-03-04

It's been two decades since the Human Genome Project first unveiled a rough draft of our genetic instruction book. The promise of that medical moon shot was that doctors would soon be able to look at an individual's DNA and prescribe the right medicines for that person's illness or even prevent certain diseases.

That promise, known as precision medicine, has yet to be fulfilled in any widespread way. True, researchers are getting clues about some genetic variants linked to certain conditions and some that affect how drugs work in the body. But many of those advances have benefited just one group: people whose ancestral roots stem from Europe. In other words, white people.

Instead of a truly human genome that represents everyone, "what we have is essentially a European genome," says Constance Hilliard, an evolutionary historian at the University of North Texas in Denton. "That data doesn't work for anybody apart from people of European ancestry."

She's talking about more than the Human Genome Project's reference genome. That database is just one of many that researchers are using to develop precision medicine strategies. Often those genetic databases draw on data mainly from white participants. But race isn't the issue. The problem is that collectively, those data add up to a catalog of genetic variants that don't represent the full range of human genetic diversity.

When people of African, Asian, Native American or Pacific Island ancestry get a DNA test to determine if they inherited a variant that may cause cancer or if a particular drug will work for them, they're often left with more questions than answers. The results often reveal "variants of uncertain significance," leaving doctors with too little useful information. This happens less often for people of European descent. That disparity could change if genetics included a more diverse group of participants, researchers agree (SN: 9/17/16, p. 8).

One solution is to make customized reference genomes for populations whose members die from cancer or heart disease at higher rates than other groups, for example, or who face other worse health outcomes, Hilliard suggests.

**"That data doesn't work for anybody apart from people of European ancestry."**

# Bulletin Board

## Curiosities

MAR. 12, 2021

And the more specific the better. For instance, African Americans who descended from enslaved people have geographic and ecological origins as well as evolutionary and social histories distinct from those of recent African immigrants to the United States. Those histories have left stamps in the DNA that can make a difference in people's health today. The same goes for Indigenous people from various parts of the world and Latino people from Mexico versus the Caribbean or Central or South America.

Researchers have made efforts to boost diversity among participants in genetic studies, but there is still a long way to go. How to involve more people of diverse backgrounds — which goes beyond race and ethnicity to include geographic, social and economic diversity — in genetic research is fraught with thorny ethical questions.

To bring the public into the conversation, Science News posed some core questions to readers who watched a short video of Hilliard explaining her views.

Again and again, respondents to our unscientific survey said that genetic research is important for improving medical care. But our mostly white respondents had mixed feelings about whether the solution is customized projects such as Hilliard proposes or a more generalized effort to add variants to the existing human reference genome. Many people were concerned that pointing out genetic differences may reinforce mistaken concepts of racial inferiority and superiority, and lead to more discrimination.

Why is genetics so white?

Some of our readers asked how genetic research got to this state in the first place. Why is genetic research so white and what do we do about it?

Let's start with the project that makes precision medicine even a possibility: the Human Genome Project, which produced the human reference genome, a sort of master blueprint of the genetic makeup of humans. The reference genome was built initially from the DNA of people who answered an ad in the Buffalo News in 1997.

Although many people think the reference genome is mostly white, it's not, says Valerie Schneider, a staff scientist at the U.S. National Library of Medicine and a member of the Genome Reference Consortium, the group charged with maintaining the reference genome. The database is a mishmash of more than 60 people's DNA.

# Bulletin Board

## Curiosities

MAR. 12, 2021

An African American man, dubbed RP11, contributed 70 percent of the DNA in the reference genome. About half of his DNA was inherited from European ancestors, and half from ancestors from sub-Saharan Africa. Another 10 people, including at least one East Asian person and seven of European descent, together contributed about 23 percent of the DNA. And more than 50 people's DNA is represented in the remaining 7 percent of the reference, Schneider says. Information about the racial and ethnic backgrounds of most of the contributors is unknown, she says.

All humans have basically the same DNA. Any two people are 99.9 percent genetically identical. That's why having a reference genome makes sense. But the 0.1 percent difference between individuals — all the spelling variations, typos, insertions and deletions sprinkled throughout the text of the human instruction book — contributes to differences in health and disease.

Much of what is known about how that 0.1 percent genetic difference affects health comes from a type of research called genome-wide association studies, or GWAS. In such studies, scientists compare DNA from people with a particular disease with DNA from those who don't have the disease. The aim is to uncover common genetic variants that might explain why one person is susceptible to that illness while another isn't.

In 2018, people of European ancestry made up more than 78 percent of GWAS participants, researchers reported in *Cell* in 2019. That's an improvement from 2009, when 96 percent of participants had European ancestors, researchers reported in *Nature*.

Change is slow

Much of the genetic databases that are used to develop precision medicine contain DNA mainly from people of European ancestry. A comparison of 2009 with 2016 shows a slight improvement. By 2019, European ancestry had dropped to 78.4 percent of the DNA.

Most of the research funded by the major supporter of U.S. biomedical research, the National Institutes of Health, is done by scientists who identify as white, says Sam Oh, an epidemiologist at the University of California, San Francisco. Black and Hispanic researchers collectively receive about 6 percent of research project grants, according to NIH data.

"Generally, the participants who are easier to recruit are people who look like the scientists themselves — people who share similar language,

# Bulletin Board

## Curiosities

MAR. 12, 2021

similar culture. It's easier to establish a rapport and you may already have inroads into communities you're trying to recruit," Oh says.

### When origins matter

Hilliard's hypothesis is that precision medicine, which tailors treatments based on a person's genetic data, lifestyle, environment and physiology, is more likely to succeed when researchers consider the histories of groups that have worse health outcomes. For instance, Black Americans descended from enslaved people have higher rates of kidney disease and high blood pressure, and higher death rates from certain cancers than other U.S. racial and ethnic groups.

In her work as an evolutionary historian studying the people and cultures of West Africa, Hilliard may have uncovered one reason that African Americans descended from enslaved people die from certain types of breast and prostate cancers at higher rates than white people, but have lower rates of the brittle-bone disease osteoporosis. African Americans have a variant of a gene called TRPV6 that helps their cells take up calcium. Overactive TRPV6 is also a hallmark of those breast and prostate cancers that disproportionately kill Black people in the United States.

The variant can be traced back to the ancestors of some African Americans: Niger-Congo-speaking West Africans. In that part of West Africa, the tsetse fly kills cattle, making dairy farming unsustainable. Those ancestral people typically consumed a scant 200 to 400 milligrams of calcium per day. The calcium-absorbing version of TRPV6 helped the body meet its calcium needs, Hilliard hypothesizes. Today, descendants of some of those people still carry the more absorbent version of the gene, but consume more than 800 milligrams of calcium each day.

Assuming that African American women have the same dietary need for calcium as women of European descent may lead doctors to recommend higher calcium intake, which may inadvertently encourage growth of breast and prostate cancers, Hilliard reported in the *Journal of Cancer Research & Therapy* in 2018.

"Nobody is connecting the dots," Hilliard says, because most research has focused on the European version of TRPV6.

### One size doesn't fit all

Some doctors and researchers advocate for racialized medicine in which race is used as proxy for a patient's genetic makeup, and treatments are tailored accordingly. But racialized medicine can backfire. Take the blood

# Bulletin Board

## Curiosities

MAR. 12, 2021

thinner clopidogrel, sold under the brand name Plavix. It is prescribed to people at risk of heart attack or stroke. An enzyme called CYP2C19 converts the drug to its active form in the liver.

Some versions of the enzyme don't convert the drug to its active form very well, if at all. "If you have the enzyme gene variant that will not convert [the drug], you're essentially taking a placebo, and you're paying 10 times more for something that will not do what something else — aspirin — will do," Oh says.

The inactive versions are more common among Asians and Pacific Islanders than among people of African or European ancestry. But just saying that the drug won't work for someone who ticked the Pacific Islander box on a medical history form is too simplistic. About 60 to 70 percent of people from the Melanesian island nation of Vanuatu carry the inactive forms. But only about 4 percent of fellow Pacific Islanders from Fiji and the Polynesian islands of Samoa, Tonga and the Cook Islands, and 8 percent of New Zealand's Maori people have the inactive forms.

### Pacific variability

The percentage of people who carry ineffective versions of CYP2C19, a gene that helps convert a blood thinner to its active form, varies from island to island in the Pacific. Knowing which version a patient has would help doctors choose the best treatment.

Assuming that someone has a poorly performing enzyme based on their ethnicity is unhelpful, according to Nuala Helsby of the University of Auckland in New Zealand. These examples "reiterate the importance of assessing the individual patient rather than relying on inappropriate ethnicity-based assumptions for drug dosing decisions," she wrote in the *British Journal of Clinical Pharmacology* in 2016.

A far better approach than either assuming that ethnicity indicates genetic makeup or that everyone is like Europeans is to analyze a person's DNA and have a precise reference genome to compare it against, Hilliard says. Deciding which genomes to create should be based on known health disparities.

"We have to stop talking about race, and we have to stop talking about color blindness." Instead, researchers need to consider the very particular circumstances and environments that a person's ancestors adapted to, Hilliard stresses.

What is diversity in genetics?

# Bulletin Board

## Curiosities

MAR. 12, 2021

Recruiting people from all over the world to participate in genetic research might seem like the way to increase diversity, but that's a fallacy, Hilliard says. If you really want genetic diversity, look to Africa, she says.

Humans originated in Africa, and the continent is home to the most genetically diverse people in the world. Ancestors of Europeans, Asians, Native Americans and Pacific Islanders carry only part of that diversity, so sequencing genomes from geographically dispersed people won't capture the full range of variants. But sequencing genomes of 3 million people in Africa could accomplish that task, medical geneticist Ambroise Wonkam of the University of Cape Town in South Africa proposed February 10 in *Nature* (SN Online: 2/22/21).

Wonkam is a leader in H3Africa, or Human Heredity and Health in Africa. That project has cataloged genetic diversity in sub-Saharan Africa by deciphering the genomes of 426 people representing 50 groups on the continent. The team found more than 3 million genetic variants that had never been seen before, the researchers reported October 28 in *Nature*. "What we found is that populations that are not well represented in current databases are where we got the most bang for the buck; you see so much more variation there," says Neil Hanchard, a geneticist and physician at Baylor College of Medicine in Houston.

What's more, groups living side by side can be genetically distinct. For instance, the Berom of Nigeria, a large ethnic population of about 2 million people, has a genetic profile more similar to East African groups than to neighboring West African groups. In many genetic studies, scientists use another large Nigerian group, the Yoruba, "as the go-to for Africa. But that's probably not representative of Nigeria, let alone Africa," Hanchard says.

That's why Hilliard argues for separate reference genomes or similar tools for groups with health problems that may be linked to their genetic and localized geographic ancestry. For West Africa, for example, this might mean different reference datasets for groups from the coast and those from more inland regions, the birthplace of many African Americans' ancestors.

Some countries have begun building specialized reference genomes. China compiled a reference of the world's largest ethnic group, Han Chinese. A recent analysis indicates that Han Chinese people can be divided into six subgroups hailing from different parts of the country. China's genome project is also compiling data on nine ethnic minorities within its borders. Denmark, Japan and South Korea also are creating country-specific reference genomes and cataloging genetic variants that

# Bulletin Board

## Curiosities

MAR. 12, 2021

might contribute to health problems that their populations face. Whether this approach will improve medical care remains to be seen.

People often have the notion that human groups exist as discrete, isolated populations, says Alice Popejoy, a public health geneticist and computational biologist at Stanford University. "But we really have, as a human species, been moving around and mixing and mingling for hundreds of thousands of years," she says. "It gets very complicated when you start talking about different reference genomes for different groups." There are no easy dividing lines. Even if separate reference genomes were built, it's not clear how a doctor would decide which reference is appropriate for an individual patient.

### Discrimination worries

One big drawback to Hilliard's proposal may be social rather than scientific, according to some *Science News* readers.

Many respondents to our survey expressed concern that even well-intentioned scientists might do research that ultimately increases bias and discrimination toward certain groups. As one reader put it, "The idea of diversity is being stretched into an arena where racial differences will be emphasized and commonalities minimized. This is truly the entry to a racist philosophy."

Another reader commented, "The fear is that any differences that are found would be exploited by those who want to denigrate others." Another added, "The idea that there are large genetic differences between populations is a can of worms, isn't it?"

Indeed, the Chinese government has come under fire for using DNA to identify members of the Uighur Muslim ethnic group, singling them out for surveillance and sending some to "reeducation camps."

People need a better understanding of what it means when geneticists talk about human diversity, says Charles Rotimi, a genetic epidemiologist and director of the Center for Research on Genomics and Global Health at the U.S. National Human Genome Research Institute, or NHGRI, in Bethesda, Md. He suggests beginning with "our common ancestry, where we all started before we went to different environments." Because the human genome is able to adapt to different environments, humans carry signatures of some of the geographic locations where their ancestors settled. "We need to understand how this influenced our biology and our history," Rotimi says.

## Bulletin Board

## Curiosities

MAR. 12, 2021

Researchers can work to understand the genetic diversity within our genome “without invoking old prejudices, without putting our own social constructs on it,” he says. “I don’t think the problem is the genome. I think the problem is humanity.”

Lawrence Brody, director of NHGRI’s Division of Genomics and Society, agrees: “The scientists of today have to own the discrimination that happened in the generations before, like the Tuskegee experiment, even though we’re very far removed from that.” During the infamous Tuskegee experiment, African American men with syphilis were not given treatment that could have cured the infection.

“We want the fruits of genetic research to be shared by everyone,” Brody says. It’s important to determine when genetic differences contribute to disease and when they don’t. Especially for common diseases, such as heart disease and diabetes, genetics may turn out to take a back seat to social and economic factors, such as access to health care and fresh foods, for example, or excessive stress, racism and racial biases in medical care. The only way to know what’s at play is to collect the data, and that includes making sure the data are as diverse as possible. “The ethical issue is to make sure you do it,” Brody says.

Hilliard says that the argument that minorities become more vulnerable when they open themselves to genetic research is valid. “Genomics, like nuclear fusion, can be weaponized and dangerous,” she says in response to readers’ concerns. “Minorities can choose to be left out of the genomic revolution or they can make full use of it,” by adding their genetic data to the mix.

## Different priorities

Certain groups are choosing to steer clear, even as scientists try to recruit them into genetic studies. The promise that the communities that donate their DNA will reap the benefits someday can be a hard sell.

“We’re telling these communities that this is going to reduce health disparities,” says Keolu Fox, a Native Hawaiian and human geneticist at the University of California, San Diego. But so far, precision medicine has not produced drugs or led to health benefits for communities of color, he pointed out last July in the *New England Journal of Medicine*. “I’m really not seeing the impact on [Native Hawaiians], the Navajo Nation, on Cheyenne River, Standing Rock. In the Black and brown communities, the least, the last, the looked over, we’re not seeing the ... impact,” Fox says.

## Bulletin Board

## Curiosities

MAR. 12, 2021

That’s because, “we have a real basic infrastructure problem in this country.” Millions of people don’t have health care. “We have people on reservations that don’t have access to clean water, that don’t have the ... internet,” he says. Improving infrastructure and access to health care would do much more to erase health disparities than any genetics project could right now, he says.

Many Native American tribes have opted out of genetic research. “People ask, ‘How do we get Indigenous peoples comfortable with engaging with genomics?’” says Krystal Tsoie, a member of the Navajo (Diné) Nation, geneticist at Vanderbilt University in Nashville, and cofounder of the Native Biodata Consortium. “That should never be the question. It sounds coercive, and there’s always an intent in mind when you frame the question that way.” Instead, she says, researchers should be asking how to protect tribes that choose to engage in genetic research.

And issues of privacy become a big deal for small groups, such as the 574 recognized Native American tribal nations in the United States, or isolated religious or cultural groups such as the Amish or Hutterites. If one member of such a group decides to give DNA to a genetic project, that submission may paint a genetic portrait of every member of the group. Such decisions shouldn’t be left in individual hands, Tsoie says; it should be a community decision.

Hilliard says minorities’ resistance to participating in genetic research is about more than a fear of being singled out; it’s the result of being experimented on but seeing medical breakthroughs benefit only white people.

“Medical researchers just need to accomplish something that benefits somebody other than Europeans,” she says. “If Blacks or Native Americans or other underrepresented groups saw even a single example of someone of their ethnicity actually being cured of the many [common] chronic diseases and specific cancers for which they are at high risk, that paranoia would evaporate overnight.”

[sciencenews.org](https://www.sciencenews.org), 4 March 2021

<https://www.sciencenews.org>

**Compound isolated from sea sponge fights cancer cells**

2021-03-07

Much of the ocean remains unexplored, unknown to humans.

**Approved for the treatment of leukemia, the drug was isolated from a marine sponge.**

# Bulletin Board

## Curiosities

MAR. 12, 2021

Increasingly, medical researchers are looking to this untapped resource in hopes of discovering novel marine chemicals that hold the potential to treat and cure human illness.

In 2019, the scientific world celebrated the 50th anniversary of the introduction of cytarabine, the very first marine-derived drug. Approved for the treatment of leukemia, the drug was isolated from a marine sponge.

As of October last year, nine drugs of marine origin had been clinically approved to treat cancer patients, according to Northwestern University.

### Compound kills cancer cells

Now, researchers from Far Eastern Federal University (FEFU) in Russia, together with colleagues from elsewhere in Russia and Germany, have isolated the compound 3,10-dibromofascaplysin from the sea sponge *Fascaplysinopsis reticulata* and then chemically synthesized it.

They tested the substance on various prostate cancer cells, including those resistant to chemotherapy.

Their findings appear in the journal *Marine Drugs*.

Researchers found that 3,10-dibromofascaplysin forces tumor cells to die via a programmed cell death mechanism.

They also reported the synthesized compound works well in combination with several already approved anti-cancer drugs.

### An intensively studied compound

Chemists first isolated the compound fascaplysin from a marine sponge in 1988. Today, it is known to possess antifungal, antibacterial, antiviral, antimalarial, and anti-tumor effects.

In 2017, FEFU researchers published a paper showing that fascaplysin derivatives kill glioblastoma multiforme cells — an aggressive type of brain cancer with a poor outlook for patients.

In 2019, several of those same FEFU researchers who published this study released research about their development of a new method to synthesize derivatives of fascaplysin.

For the first time, they managed to get a sufficient amount of 3-bromofascaplysin and 3,10-dibromofascaplysin. These compounds

# Bulletin Board

## Curiosities

MAR. 12, 2021

were used for first syntheses of the alkaloids 14-bromoreticulatate and 14-bromoreticulatine.

Researchers found that 14-bromoreticulatine selectively affects *Pseudomonas aeruginosa*, a bacterium that is resistant to many types of antibiotics. They also reported that 3,10-dibromofascaplysin was able to target metabolic activity of prostate cancer cells.

### Moving forward

Later in 2021, the researchers hope to report the outcomes of studying how 3,10-dibromofascaplysin affects non-cancer cells.

Fascaplysin is highly toxic to healthy cells, which, until now, has limited its use as a drug.

“In our laboratory, we are trying to modify the structure of these compounds in order to reduce their cytotoxic effect on normal cells, while maintaining the necessary anti-tumor effect,” explains Dr. Maxim Zhidkov, head of the Organic Chemistry Department at FEFU’s School of Natural Sciences in Russia.

“The goal is to create a substance for targeted therapy, with a minimum of side effects for healthy cells of the body.”

The researchers speculate that it could take between 10 and 15 years before their work results in the development of a new drug.

[medicalnewstoday.com](https://www.medicalnewstoday.com), 7 March 2021

<https://www.medicalnewstoday.com>

## FDA continues investigation into dog heart damage linked to diet

2021-03-07

It was only by chance that veterinarians discovered that Martha Martin’s beloved black Lab, Sophie, had developed a potentially fatal heart disease.

The dog was being treated for a snake bite when the veterinarian detected an abnormal heart rhythm and ordered up an echocardiogram.

“I’ll never forget when the vet turned to me and asked if Sophie was being fed a grain-free dog food,” Martin remembers. “I felt like someone sucker punched me.”

**“I’ll never forget when the vet turned to me and asked if Sophie was being fed a grain-free dog food,” Martin remembers. “I felt like someone sucker punched me.”**

# Bulletin Board

## Curiosities

MAR. 12, 2021

The 7-year-old dog had been consuming the same brand of grain-free canine food since she was a puppy — as had Martin's other dog, Bailey. An echocardiogram showed that 9-year-old Bailey also had the beginnings of dilated cardiomyopathy, or DCM.

Martin switched both dogs to a different food, one that contained grain, hoping that might help heal their hearts.

In the more than two years since the Food and Drug Administration first warned dog owners about heart failure in their animals that may be associated with grain-free pet foods, more than 200 dogs have reportedly died from the condition and scientists are still trying to figure out why.

Research has suggested that ingredients used in place of grains in dog food might be involved in the development of DCM, a disease in which the heart gets larger, leaving it weaker. Some breeds of large dogs are genetically susceptible to DCM, including Great Danes, German shepherds and Doberman pinschers, according to VCA Animal Hospitals.

"Most of the diets associated with the reports of non-hereditary DCM have legume seed ingredients, also called "pulses"— peas and lentils, for example — high in their ingredient lists," FDA spokesperson Monique Richards said. "Although soy is a legume, we did not see a signal associated with this ingredient."

The issue may be the quantity of ingredients used in nontraditional dog foods.

"Legumes, including pulse ingredients, have been used in pet foods for many years, with no evidence to indicate they are inherently dangerous, but analysis of data reported to [the FDA] indicates that pulse ingredients are used in many "grain-free" diets in greater proportion than in most grain-containing formulas," Richards said in an email to NBC News. "FDA has asked pet food manufacturers to provide diet formulations so we can further understand the proportions of ingredients in commercially-available diets and possible relationships with non-hereditary DCM."

However, it's not clear whether it's simply the amount of these ingredients in the foods, said Dr. Bruce Kornreich, a veterinary cardiologist in the department of clinical sciences at the Cornell University College of Veterinary Medicine.

"It may not just be what is in the diet," he said. "It could be where it's sourced from or how it's processed."

# Bulletin Board

## Curiosities

MAR. 12, 2021

A recent study showed that dogs with DCM that were consuming nontraditional dog foods were more likely to show improvements in the condition and to live longer if, along with their heart medications, they were switched to a traditional dog food.

"Our study was a retrospective look at 75 dogs with DCM over a period of time that was just under five years," said the study's co-author, Dr. Lisa Freeman, a veterinary nutritionist and a professor at the Cummings School of Veterinary Medicine at Tufts University. "One of the new findings in our study was that we had a significant increase over time in the number of dogs with DCM. That increase began even before the first FDA alert."

To date, the FDA hasn't recommended a recall of any grain-free products or declared any specific pet food products unsafe. To submit a safety report to the FDA, go to the Safety Reporting Portal.

The Pet Food Institute responded in a statement to NBC News, "PFI member nutritionists, veterinarians and product safety specialists have been closely studying dilated cardiomyopathy (DCM) to better understand whether there is a relationship between DCM and diet in dogs not genetically predisposed to the disease. Drawing on our review of both historic and recent scientific analyses and published papers, PFI members are devoting thousands of hours to improving our understanding of DCM and its causes, all with the goal of advancing pet well-being."

[nbcnews.com](https://www.nbcnews.com), 7 March 2021

<https://www.nbcnews.com>

### When should you end a conversation? Probably sooner than you think

2021-03-01

While studying for his master's degree at the University of Oxford, Adam Mastroianni confronted a fear common to many party goers: Would he get stuck in a conversation with no polite way out?

Then, Mastroianni had another thought: Perhaps his future conversation partner had the same concern. "What if we're all trapped in conversations because we mistakenly think the other person wants to continue?" he says.

Now, 5 years and one scientific publication later, Mastroianni has discovered both fears are well-founded: Most conversations don't end when people want them to.

**"What if we're all trapped in conversations because we mistakenly think the other person wants to continue?" he says.**

## Bulletin Board

## Curiosities

MAR. 12, 2021

To get a clear picture of how people really felt when engaged in conversation, Mastroianni—now a Ph.D. student in psychology at Harvard University—and his colleagues invited 252 strangers into their lab. They paired them up to chat for as long as they wanted, up to 45 minutes. The volunteers were told whatever time they didn't spend on conversation would be spent on other experimental tasks—so there was no motivation to end the discussion early.

Most of the pairs engaged in idle chitchat: asking where someone grew up, or what they were studying. A lot of the conversations were so boring, Mastroianni says, it was “hard to watch them.”

Next, the researchers asked participants how they gauged their own experience. Of 126 conversations, only 2% ended when both participants wanted them to, they report today in the Proceedings of the National Academy of Sciences. Some extraverted souls had wanted to chat longer, but 69% of the participants said they wanted the conversation to end before it did. On average, people wanted their conversations to be 50% longer or shorter.

The difference seems to stem from people hiding their true desires, Mastroianni says. Because individuals worry that ending a conversation could be rude or offensive, they purposefully don't signal to others when they want out. That makes it difficult to guess what a conversational partner wants, he says.

To see how good people were at intuiting their partners' preferences, the researchers asked participants to guess what they thought their conversation partners had wanted, and found that their estimates were far from reality: Some underestimated and others overestimated how long their partners wanted to speak; on the whole, their guesses were about 64% off (in both directions). About 60% of the time, both partners were in accord: They both wanted the chat to end earlier—or later. Only in a minority of cases did one partner want to yammer on whereas the other wished to cut things off.

The new study is the first to put numbers on how difficult it is for people to balance their own goals with what their conversational partners want, says University of Glasgow psychologist Dale Barr, who was not involved in the study. The disconnect between what people wanted, and what their partners thought they wanted, is an important finding, he says. The work, Barr says, gels with other research that suggests people are generally less skilled than we might imagine at working out what others think.

## Bulletin Board

## Curiosities

MAR. 12, 2021

Mastroianni and his colleagues also surveyed 806 people on the online crowdsourcing platform Mechanical Turk, asking them to describe a recent in-person conversation—and how long they actually wished it had lasted. Similar to the lab results, 67% of people reported they wanted out before the conversation was done—and most wished their conversation had been 50% longer or shorter than the actual chat.

That's surprising, because most of these chats were with friends and family, Mastroianni says. But, “Just like you wouldn't cut off a stranger and walk away, you also wouldn't do the same thing to your mother.”

The research is an excellent example of how little is known about how conversation works, says Tanya Stivers, a sociologist at the University of California, Los Angeles, who was not involved in the research. The fact that the two studies found similar results serves as good confirmation of the findings, she says.

The take-home point? The next time you're talking to someone at a party, don't try to guess whether your partner wants to end or continue the chat, Mastroianni says. “You really have no idea when the other person wants to go,” he says. “So maybe, stop trying and just relax and enjoy the conversation.”

sciencemag.org, 1 March 2021

<https://www.sciencemag.org>

### Female green tree frogs have noise-canceling lungs that help them hear mates

2021-03-04

To find her mate amidst a cacophony of frog croaks, groans, squeaks and trills, a female green tree frog just needs to take a deep breath.

During mating season, ponds resound with the sounds of hundreds of males from many different species crying out to potential mates. Homing in on eligible males against all this crooning presents a significant challenge for females, akin to straining to understand a friend at a raucous party. But by simply inflating her lungs, an American green tree frog (*Hyla cinerea*) can make her eardrums less sensitive to the sounds of other species, researchers report March 4 in *Current Biology*.

“We think the lungs are working a bit like some noise-canceling headphones,” says Norman Lee, a neuroethologist at St. Olaf College in

**“We think the lungs are working a bit like some noise-canceling headphones,” says Norman Lee, a neuroethologist at St. Olaf College in Northfield, Minn., allowing females to filter out environmental noise at the eardrum itself.**

# Bulletin Board

## Curiosities

MAR. 12, 2021

Northfield, Minn., allowing females to filter out environmental noise at the eardrum itself.

An eardrum is just taut tissue that vibrates when sound waves hit it, ultimately translating the bleating and buzzing of the natural world into signals that get processed in the brain. To mammals like us, eardrums and lungs seem completely unrelated. But there's a direct connection, via an open space, between the body parts in frogs that runs through the throat and into the frogs' head. That lets frog eardrums pick up sound from outside the ear and also register vibrations from the lungs.

Earlier research hinted that this lung-to-ear connection might boost a frog's ability to pinpoint the call of a potential mate by providing an extra input of sound, but that hypothesis didn't pan out when Lee, who conducted the research at the University of Minnesota, and his colleagues tested it. Instead, they found something even more unusual when they aimed a laser vibrometer, which measures vibrations from a distance, at frogs bombarded with sound waves in the lab.

When the researchers played females a suite of sounds, something strange happened between 1,400 and 2,200 hertz. Within that range, the frogs' inflated lungs resonated with extra vibrations and the movement of the eardrum quieted, by the equivalent of four to six decibels, on average.

"That's a difference that would be noticeable by a frog," Lee says. Somehow, the extra vibrations of the lungs cancel out sounds of the same frequency at the eardrum, reducing sensitivity in this range.

This dip in sensitivity falls just between the two most prominent frequencies of a male green tree frog's croak, suggesting that inflated lungs don't affect a female's ability to hear her own species. But the dip does coincide with the dominant frequency of five species that are often found calling at the same ponds, such as bullfrogs and barking tree frogs. How precisely the lungs quiet these sounds at the eardrum remains unclear, but the net effect is a significant reduction in environmental noise that allows females to focus on the calls that matter, the researchers say.

"I was almost overwhelmed by this paper," says Mike Ryan, an evolutionary biologist at the University of Texas at Austin. "It shows that the function of the eardrum isn't static, but can be dynamically changed by the lungs in a way that reduces sensitivity to frequencies that aren't important to the frog."

### Users of the mnemonic technique, called the "method of loci," mentally navigate around a familiar place, such as a path (or Holmes' palace)

# Bulletin Board

## Curiosities

MAR. 12, 2021

These frogs are in really noisy environments, Ryan says, and sifting through all that noise to find relevant signals requires a lot of processing power by the brain. "This lung trick really cleans up the sounds" before they even reach the brain, Ryan says. "We don't think of the lungs playing a role in hearing, but the way this is working is just really, really cool."

sciencenews.org, 4 March 2021

<https://www.sciencenews.org>

### Sherlock Holmes' famous memory trick really works

2021-03-06

Sherlock Holmes remembers everything by imagining that he's storing bits of information in a "memory palace," a technique that originated in ancient Greece. Now, researchers have found that this method really does work to create long-lasting memories.

Users of the mnemonic technique, called the "method of loci," mentally navigate around a familiar place, such as a path (or Holmes' palace). To remember a piece of information, you "drop" it along the path and later retrace your steps and "pick it up." For example, if you're very familiar with Central Park in New York City, you can imagine walking through it, dropping the word "book" at the Boat House, then the word "water bottle" at the next bend, then the word "space" at the fountain. When you want to remember the words, you imagine retracing your exact steps.

By training with this method, the world's best memory champions can remember inordinate amounts of information, like word lists, digit series and decks of cards, according to the study. But the World Memory Championships test only short-term memory and only a handful of studies have looked into the brain as people use this method to improve memory.

#### Y SOUND

"We became fascinated by how such extraordinary memory performance as shown in the World Memory Championships is possible," said lead author Isabella Wagner, a cognitive neuroscientist at the University of Vienna. (One of the study co-authors, Boris Konrad — a researcher at the Donders Institute for Brain, Cognition and Behaviour in Nijmegen, Netherlands — is a memory champion himself.)

The method of the loci uses well-known places or routes as a "scaffold" or "structure" to embed novel, unrelated information, Wagner said. The

# Bulletin Board

## Curiosities

MAR. 12, 2021

combination of prior knowledge — the familiar route — and the novel information “is very powerful to boost memory,” she added.

To evaluate the method of loci, Wagner and her team enrolled 17 “memory athletes,” or champions who were ranked among the world’s top 50 in memory competitions, and 16 others that matched the athletes in characteristics such as age and intelligence. The researchers took functional magnetic resonance imaging (fMRI) scans of the participants’ brains while asking them to study random words on a list. Then, the researchers presented the participants with three words at a time from the list and asked them to recall if the words were in the same order as previously studied.

In the second part of the study, they enrolled 50 participants who previously had no experience in mnemonics and trained 17 of them for six weeks to recall memories using the method of loci. The rest of the participants were in the control group (16 of them were “active controls” which meant they were trained using a different memory tactic called “working memory training,” and 17 were “passive controls,” meaning they weren’t trained at all). They again scanned the participants’ brains with fMRI as they performed the same tasks, both before and after training. The researchers also asked the participants to recall which words were on the list 20 minutes and 24 hours after their fMRI scans.

The team used this test to define “weak memories,” or those that could be remembered after 20 minutes but not after 24 hours, and “durable memories,” or those that could be remembered 24 hours later. Four months later, the researchers retested the participants’ ability to memorize and recall words.

### Better memory

As expected, the participants showed better, longer-lasting memory after training with the method of loci than after training with the other memory technique or with no technique at all. The participants who trained with the ancient method showed a significant increase in durable memories, but not a significant change in weak memories (or short-term memories that faded after 20 minutes), compared with the control groups.

After 20 minutes, the people who were trained with the method of loci remembered about 62 words from the list, whereas those who were trained with the other method remembered 41 and those who weren’t trained at all remembered 36. After 24 hours, the people who were trained

# Bulletin Board

## Curiosities

MAR. 12, 2021

with the method of loci remembered about 56 words, versus 30 and 21 in the control groups, respectively.

Four months later, people who were trained with the method of the loci could remember about 50 words, versus 30 and 27 in the control groups, respectively. What’s more, world memory champions and the participants who trained with the method of loci showed similar brain activity as they memorized word lists and ordering.

The team also came across something unexpected: While both the world champions and the participants were partaking in these tasks, activity in their brains declined in regions typically involved in memory processing and long-term memory, Wagner told Live Science in an email. “This was somewhat surprising to us, as better performance is typically associated with increased engagement of different brain regions,” she said.

In other words, they found that less brain activation led to better memory, which may be because the method of loci prompts the brain to work more efficiently, Wagner said. In addition, while the participants rested, those who had been trained with the method of loci had increases in brain connectivity between other regions important for storing long-term memory.

Almost anyone can learn to use the method of the loci, Wagner said. “It obviously requires time and regular practice and might thus not be suited for everyone, but it is definitely possible to ‘boost’ memory and reach high, or even exceptional, memory performance.”

The researchers didn’t test how this training might generalize to other situations, such as remembering things other than words. Nor is it clear if the technique might help to ease cognitive decline during healthy aging or if it might be helpful for preventing or slowing disease, Wagner said. “However, we are quite excited about these results, and a whole avenue of new questions opens up that should give future studies ample material to investigate,” she said.

The findings were published Wednesday (March 3) in the journal *Science Advances*.

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# Bulletin Board

## Technical Notes

MAR. 12, 2021

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

### CHEMICAL EFFECTS

Persistent organic and inorganic pollutants in the effluents from the textile dyeing industries: Ecotoxicology Appraisal via a battery of Biotests

A putative adverse outcome pathway network for disrupted female pubertal onset to improve testing and regulation of endocrine disrupting chemicals

Impact of endocrine-disrupting chemicals on steroidogenesis and consequences on testicular function

### ENVIRONMENTAL RESEARCH

Hallmarks of environmental insults

Pretreatment of industrial wastewater by natural flotation: application to pollution reduction from vegetable oil refinery wastewaters

### OCCUPATIONAL

Inhalation of Soluble Plutonium: 53-year Follow-up of Manhattan Project Worker

The Perception of Occupational Safety and Health (OSH) Regulation and Innovation Efficiency in the Construction Industry: Evidence from South Korea

Exposure to Phthalate and Organophosphate Esters via Indoor Dust and PM10 Is a Cause of Concern for the Exposed Saudi Population

### PHARMACEUTICAL/TOXICOLOGY

Diclofenac-induced cytotoxicity in cultured carp leukocytes

Altered microbiomes in thirdhand smoke-exposed children and their home environments