

# Bulletin Board

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

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## Regulatory Update

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## ASIA PACIFIC

**China criticized for screening packaged foods for coronavirus**

2020-11-20

China finds coronavirus on food packaging from 20 countries, restricts the import of food products, does not share lab results; attracts criticism from trade partners that demand end to restriction, more information on used testing methods; World Trade Organization (WTO) meeting to reconcile conflict not successful

GlobalNews reported on November 18, 2020, about a conflict arising between China and several food-exporting countries. The Chinese health authorities claim to have found coronavirus on food packaging imported from 20 different countries and decided to deny the affected products from being imported. However, several countries are criticizing China for withholding evidence, calling it "unjustified trade restrictions" and not complacent with global norms of trade.

The parties sought bilateral reconciliation in a meeting at The World Trade Organization (WTO) in Geneva on November 5-6, 2020.

China argues it has isolated viable coronavirus from imported frozen cod (as reported on October 19, 2020, in The Guardian) and justified its strict measures at the WTO meeting with the argument of them being based on scientific evidence and "designed to protect people's lives to a maximum extent." Furthermore, Chinese authorities see a risk of the virus reentering the country through imported food products as mentioned in an article in the government associated publication Global Times.

Nevertheless, already in April 2020, The World Health Organization (WHO) published a document in which they dismiss the transmission route to humans from food or packaging (FPF reported).

Several countries, including Canada, the US, Brazil, and New Zealand, question China's screening and restriction measures, which they argue threaten to harm trade and reputation of imported food products. They emphasize that evidence for positive test results are missing or not shared by the Chinese health authorities. The US Department of Agriculture (USDA) specifically stated that "China's most recent COVID-19 restrictions on imported food products are not based on science and threaten to disrupt trade."

**The Chinese health authorities claim to have found coronavirus on food packaging imported from 20 different countries and decided to deny the affected products from being imported.**

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### Full Article

Food Packaging Forum, 20 November 2020

<https://www.foodpackagingforum.org/news/global-trade-partners-criticize-chinas-coronavirus-screening-and-restriction-of-food-products>

### Asian governments aims to expand recycled content in plastic FCMs

2020-11-24

Overview article examines recent commitments by South Korea, China, and Thailand to launch or expand approval of recycled plastics for use in food contact materials (FCMs); lack of regional definition of 'food grade plastic' seen as stumbling block to many local recyclers in meeting growing demand

In an overview article published on November 19, 2020, Independent Commodity Intelligence Services (ICIS) discusses what appears to be a shift across Asia over the past year by multiple national regulatory agencies to more widely allow recycled plastics for use in food contact materials (FCMs). It refers to announcements made earlier this year by South Korea (FPF reported), China (FPF reported), and Thailand (FPF reported) to consider allowing or expanding approved uses of recycled plastics in FCMs including from mechanically recycled plastics and from resins including polyethylene terephthalate (PET) and high-density polyethylene (HDPE).

"The use of recycled materials in FCM is becoming a 'very hot topic' in China," commented Zhu Lei, the Deputy Director of China's National Center for Food Safety Risk Assessment (CFSA) during a recent regulatory conference hosted by Chemical Watch. The article sees these as "major announcements that will drive the region's circularity of plastics, further supporting the achievement of both country and brand's sustainability targets." However, it also recognizes the challenges remaining that "the industry needs to address to ensure these FCMs are in fact 'food grade.'" This is especially the case considering that the Asian region does not have an "overarching regulating body or regionally agreed definition of what food grade plastics are." Japan is described as being the only country having a regulatory framework for food grade recycled plastics, which is based on a positive list system (FPF reported).

**However, it also recognizes the challenges remaining that "the industry needs to address to ensure these FCMs are in fact 'food grade.'"**

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### Full Article

Food Packaging Forum, 24 November 2020

<https://www.foodpackagingforum.org/news/asian-governments-aim-to-expand-recycled-content-in-plastic-fcms>

## AMERICA

### BAN TOXIC RETARDANTS BILL (H 4900)

2020-11-09

The House approved and sent to the Senate legislation that would ban 11 toxic flame retardants from children's products, bedding, carpeting and residential upholstered furniture sold or manufactured in Massachusetts, except for inventory already manufactured prior to December 31, 2021.

Violators would be fined up to \$5,000 for a first offense, \$25,000 for a second offense and up to \$50,000 for a second and subsequent offenses. Motor vehicles, watercraft, aircraft, all-terrain vehicles, off-highway motorcycles and electronic devices are exempt from this law as are any previously owned products that contain a retardant.

Another provision requires the Department of Environmental Protection to review, at least every three years, chemical flame retardants used in these type of products and include them on the list of prohibited chemical flame retardants that are documented to pose a health risk.

### Full Article

The Somerville New Weekly, 9 November 2020

<https://thesomervillenewsweekly.blog/2020/11/09/ban-toxic-flame-retardants-bill-h-4900/>

### New York state prohibits facility from incinerating PFAS-containing firefighting foams

2020-11-25

New York Governor Andrew Cuomo has signed legislation, restricting the incineration of aqueous film-forming foam (AFFF) containing per- and polyfluoroalkyl substances (PFASs) in cities in the state of a certain size that have a designated environmental justice area.

**Violators would be fined up to \$5,000 for a first offense, \$25,000 for a second offense and up to \$50,000 for a second and subsequent offenses.**

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Restrictions in the new law – signed on 23 November – will focus primarily on the city of Cohoes, a former textile manufacturing hub located 15 miles north of Albany, the state capital. It is the home of the Norlite hazardous waste management facility, which previously had stored, handled and incinerated waste AFFF that contained PFASs. According to the state's Department of Environmental Conservation (DEC), the Norlite facility had previously been authorised to burn AFFF as fuel.

In June, after residents raised concerns of potential PFAS exposure, the DEC ordered the facility to stop incineration of the firefighting foams containing PFASs and initiated a programme to study nearby soil and water samples for potential contamination.

In a statement announcing the signing of the bill (SB 7880B), Governor Cuomo's office said the law "bolsters the department's ongoing response to concerns raised by residents in the city of Cohoes to ensure the environment and community are protected after foam containing PFAS was disposed at the Norlite facility".

### Full Article

Chemical Watch, 25 November 2020

<https://chemicalwatch.com/183679/new-york-state-prohibits-facility-from-incinerating-pfas-containing-firefighting-foams>

### **The harmful chemical lurking in your children's toys**

2020-11-23

Heather Stapleton vividly recalled the moment she realized that the dangerous chemicals she studied in her lab had entered her home.

Dr. Stapleton, a chemist at Duke University, had just put her 1-year-old son to bed and was chatting with a colleague in her living room about their latest research. The scientists were talking about the toxic chemicals they'd found in baby gear, added to prevent them from catching on fire. Suddenly, they noticed a tag on her son's polyester tunnel. "We're like, wait," Dr. Stapleton said. "Is that a flammability standard on the tunnel?"

Sure enough, the tunnel's tag said that it met a flammability standard for camping tents, meaning that the material contained chemical flame retardants that would prevent it from catching — and staying — on fire.

**"We're like, wait," Dr. Stapleton said. "Is that a flammability standard on the tunnel?"**

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## Regulatory Update

DEC. 04, 2020

### Full Article

The New York Times, 23 November 2020

<https://www.nytimes.com/2020/11/23/parenting/home-flame-retardants-dangers.html>

### **US EPA extends PV29 TSCA evaluation comment period**

2020-11-24

US Environmental Protection Agency (EPA) extends comment period for draft risk evaluation of C.I. Pigment Violet 29 (PV29) under its TSCA regulation; new draft adds previously confidential business data, solubility testing data, workplace air monitoring; concludes 11 of 14 conditions of use for PV29 pose unreasonable risk; toxicity debate ongoing also in Europe; EPA extends comment period for the revised draft until December 19, 2020

On November 19, 2020 news provider Chemical Watch reported that the U.S. Environmental Protection Agency (EPA) is extending the comment period until December 19, 2020, for their latest risk evaluation draft of C.I. Pigment Violet 29 (PV29) previously published on October 10, 2020.

PV29 (CAS 81-33-4) is the first of 10 substances to be reevaluated under the new Toxic Substances Control Act (TSCA) that was amended on June 22, 2016 (FPF reported). The polycyclic aromatic dye compound is a food- or food contact additive, suspected to negatively affect human health and the environment.

In their first draft assessment of PV29 from November 2018, the EPA concluded that "C.I. Pigment Violet 29 does not present an unreasonable risk of injury to human health or the environment under the conditions of use." However, following publication the original draft has been widely criticized by public comments (see the EPA's summary) for (1) the lack of reproductive, developmental, and toxicity tests, (2) missing reports on physical-chemical properties, and (3) weak animal data to support claims of low risk of exposure via oral and dermal routes.

The EPA largely based their argumentation on the observed low water solubility of PV29 (0.01 mg/L), which leads to low bioavailability and therefore low risk of exposure for consumers and the environment.

Richard Denison, Lead Senior Scientist of the Environmental Defense Fund (EDF) has been following the assessment since December 2018. In one of his posts, he criticizes especially the low quality of available data regarding

**The polycyclic aromatic dye compound is a food- or food contact additive, suspected to negatively affect human health and the environment.**

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the water solubility of PV29, which is the basis of argumentation for PV29 being a low hazard. Denison writes that: "BASF itself labeled these two studies 'not reliable' due to use of an 'unsuitable test system' and said the studies should be 'disregarded due to major methodological deficiencies.'"

Following the suggestions of a Scientific Advisory Committee peer review and multiple public comments, the EPA has added to the new draft version, among others, (1) previously confidential business information of manufacturers, (2) revised solubility testing and, (3) a workplace air monitoring program finding a potential "lung overload" risk.

### Full Article

Food Packaging Forum, 24 November 2020

<https://www.foodpackagingforum.org/news/us-epa-extends-pv29-tsca-evaluation-comment-period>

## EUROPE

### Marked improvement in Europe's air quality over past decade, fewer deaths linked to pollution

2020-11-25

Better air quality has led to a significant reduction of premature deaths over the past decade in Europe. However, the European Environment Agency's (EEA) latest official data show that almost all Europeans still suffer from air pollution, leading to about 400,000 premature deaths across the continent.

The EEA's 'Air quality in Europe — 2020 report' shows that six Member States exceeded the European Union's limit value for fine particulate matter (PM2.5) in 2018: Bulgaria, Croatia, Czechia, Italy, Poland, and Romania. Only four countries in Europe — Estonia, Finland, Iceland and Ireland — had fine particulate matter concentrations that were below the World Health Organization's (WHO) stricter guideline values. The EEA report notes that there remains a gap between EU's legal air quality limits and WHO guidelines, an issue that the European Commission seeks to address with a revision of the EU standards under the Zero Pollution Action Plan.

The new EEA analysis is based on the latest official air quality data from more than 4 000 monitoring stations across Europe in 2018.

**Only four countries in Europe — Estonia, Finland, Iceland and Ireland — had fine particulate matter concentrations that were below the World Health Organization's (WHO) stricter guideline values.**

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Exposure to fine particulate matter caused about 417,000 premature deaths in 41 European countries in 2018, according to the EEA assessment. About 379,000 of those deaths occurred in EU-28 where 54,000 and 19,000 premature deaths were attributed to nitrogen dioxide (NO<sub>2</sub>) and ground-level ozone (O<sub>3</sub>), respectively. (The three figures are separate estimates and the numbers should not be added together to avoid double counting.)

EU, national and local policies and emission cuts in key sectors have improved air quality across Europe, the EEA report shows. Since 2000, emissions of key air pollutants, including nitrogen oxides (NO<sub>x</sub>), from transport have declined significantly, despite growing mobility demand and associated increase in the sector's greenhouse gas emissions. Pollutant emissions from energy supply have also seen major reductions while progress in reducing emissions from buildings and agriculture has been slow.

### Full Article

Eureporter, 25 November 2020

<https://www.eureporter.co/environment/2020/11/25/marked-improvement-in-europes-air-quality-over-past-decade-fewer-deaths-linked-to-pollution/>

## INTERNATIONAL

### Guide for retailers on implementing safer chemicals and materials

2020-11-18

Clean Production Action publishes guide to help retailers create chemicals strategies, ensure use of safer chemicals and materials; outlines key steps to establish inventories with brands and suppliers, measure chemical footprint, publicly disclose policies and progress

On November 13, 2020, non-governmental organization *Clean Production Action* announced the publication of a new guide for retailers describing why and how they should take action on chemicals of concern in their products. The organization writes that "retailers need to move beyond regulatory compliance if they are to meet customer expectations for safer chemicals in products, respond to investor inquiries, and achieve favorable profiles in rankings by advocacy groups." With the thousands of chemicals

**With the thousands of chemicals present on the market and in products, however, the organization recognizes that it can be an overwhelming task just to know how to begin.**

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present on the market and in products, however, the organization recognizes that it can be an overwhelming task just to know how to begin.

To support retailers, *Clean Production Action's* guide outlines best practices as developed under the organization's Chemical Footprint Project (FPF reported). It further breaks down key steps that can be taken into five separate modules addressing: (i) developing a chemicals strategy, (ii) using restricted substances lists and priority products to remove chemicals of concern, (iii) building a chemical inventory with brands and suppliers, (iv) measuring a retailer's own chemical footprint, and (v) publicly disclosing set policies and progress being made towards set goals. Overall, the new publication is described as being "a how-to guide for retailers that want both to address consumer concerns with hazardous chemicals in products and meet consumer preferences for products made with the safest and healthiest chemicals and materials."

### Full Article

Food Packaging Forum, 18 November 2020

<https://www.foodpackagingforum.org/news/guide-for-retailers-on-implementing-safer-chemicals-and-materials>

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## REACH Update

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### **ECHA's CLH proposal on TBBPA open for consultation**

2020-11-26

Norway submits harmonized classification and labeling (CLH) proposal to European Chemical Agency (ECHA) for brominated flame retardant tetrabromobisphenol A (TBBPA); suggests adding classification of being possibly carcinogenic following rodent studies providing evidence; proposal still open for comments until January 29, 2021

On November 19, 2020, news provider ChemicalWatch reported in their weekly "ECHA round-up" that Norway recently submitted a Harmonized Classification and Labeling (CLH) proposal regarding the flame retardant chemical tetrabromobisphenol A (TBBPA) (CAS 79-94-7).

The substance has previously been found in food contact materials (FPF reported) and represents the most widely used brominated flame retardant (BFR) worldwide. BFRs are a group of chemicals that have been characterized as often being persistent, bioaccumulative, and toxic (PBT). Earlier this year, Australia had already classified this compound as a category 2 carcinogen (FPF reported).

So far TBBPA has only been listed as an acute and chronic hazard for aquatic environments under REACH. However, the substance has been under evaluation for PBT and endocrine disrupting (ED) properties as part of the EU's Community rolling action plan (CoRAP). The Norwegian authorities submitted a proposal to the European Chemical Agency ECHA that collects information from recent scientific studies that it says justifies adding the classification "possibly carcinogenicity 2a".

### Full Article

Food Packaging Forum, 26 November 2020

<https://www.foodpackagingforum.org/news/echas-clh-proposal-on-tbbpa-open-for-consultation>

### **EU surveys consumers on nanotechnology**

2020-11-18

European Observatory for Nanomaterials (EUON) publishes survey that reveals 87% of consumers from five EU countries wish for better labelling of everyday products containing nanotechnology

The European Chemicals Agency (ECHA) published a press release on November 16, 2020, highlighting a newly published survey report from

**The substance has previously been found in food contact materials (FPF reported) and represents the most widely used brominated flame retardant (BFR) worldwide.**

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the European Observatory for Nanomaterials (EUON). The survey assessed for five selected EU countries (Austria, Bulgaria, Finland, France, and Poland) how citizens “perceive nanomaterials and their potential risks to health and environment.”

The main findings include a generally low of awareness of nanomaterials, albeit the level of awareness has increased compared to earlier studies. Furthermore, one major result of the study was that 87% of people responded they would like to have a way to know whether a product contains nanomaterials.

Based on the survey, the EUON announced three recommendations: Firstly, increasing Europeans’ awareness of the benefits and risks of nanomaterials, which could be achieved by e.g. developing a label. Secondly, it suggested to expand the survey to all 27 EU countries, and finally, in case of a labelling, the most appropriate type of labelling for products needs to be identified.

EUON finds that implementing these recommendations will help improve available information and communication on nanomaterials. This, in turn, will facilitate consumers’ understanding of how and where nanotechnology is used in everyday products as well as their risks and benefits.

The EUON was launched June 2017 (FPF reported) as an information platform with the key purpose to offer a free resource for EU citizens and all stakeholders to find easily accessible and relevant safety information on nanomaterials available on the EU market.

### Full Article

Food Packaging Forum, 18 November 2020

<https://www.foodpackagingforum.org/news/eu-surveys-consumers-on-nanotechnology>

### **ECHA calls for comments on chlorinated paraffins**

2020-11-16

European Chemicals Agency (ECHA) seeks information on manufacture, use, exposure, environmental release of chlorinated alkanes to inform restriction proposal; comments accepted until December 15, 2020

On November 11, 2020, the *European Chemicals Agency (ECHA)* announced a call for comments and evidence on the substance “alkanes, C14-17,

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chloro” (CAS 85535-85-9) in preparation for a restriction proposal under the REACH regulation. News provider *Chemical Watch* reports that the substances are medium-chain chlorinated paraffins largely used in the manufacture of polyvinyl chloride (PVC), polymers, rubber, sealants, and adhesives. If the substance is identified as a substance of very high concern (SVHC), risk management via a restriction on its uses may be imposed. The call is requesting stakeholders to submit information “on the manufacture, import, use, exposure and environmental release of Alkanes, C14-17, chloro in the EU/EEA, as well as on the possibility for substitution (potential alternative substances or techniques) and on the socio-economic impacts of substitution.” Comments are being accepted until December 15, 2020.

### Full Article

Food Packaging Forum, 16 November 2020

<https://www.foodpackagingforum.org/news/echa-calls-for-comments-on-chlorinated-paraffins>

**If the substance is identified as a substance of very high concern (SVHC), risk management via a restriction on its uses may be imposed.**

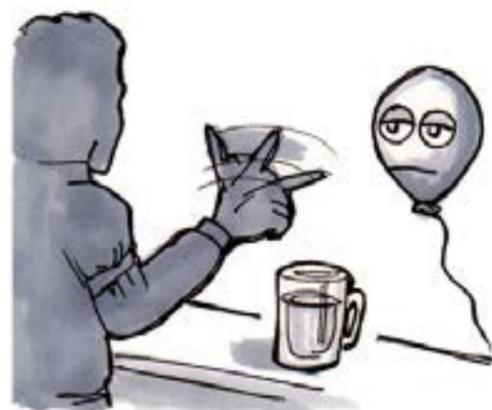
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## Janet's Corner

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## Helium Walks into a Bar

2020-12-04



HELIUM WALKS INTO A BAR.  
BARTENDER SAYS, "WE DON'T SERVE  
NOBLE GASES HERE."



He DOES NOT REACT.

<https://www.chemistryjokes.com/jokes/helium-walks-into-a-bar/>

## Bulletin Board

## Hazard Alert

DEC. 04, 2020

## Nitric Acid

2020-12-04

Nitric acid, also known as aqua fortis and spirit of niter, is a highly corrosive strong mineral acid with the molecular formula  $\text{HNO}_3$ . The pure compound is colourless, but older samples tend to acquire a yellow cast due to decomposition into oxides of nitrogen and water. Most commercially available nitric acid has a concentration of 68%. When the solution contains more than 86%  $\text{HNO}_3$ , it is referred to as fuming nitric acid. Depending on the amount of nitrogen dioxide present, fuming nitric acid is further characterised as white fuming nitric acid or red fuming nitric acid, at concentrations above 95%. Nitric acid is the primary reagent used for nitration - the addition of a nitro group, typically to an organic molecule. Nitric acid is also a strong oxidising agent. [1]

## USES [2]

Nitric acid is used in a wide variety of chemical processes where cleaning, oxidising or etching is required, including making synthetic fibres, dyeing, electrical circuit board making, electroplating, explosives, laboratory chemicals, metal cleaning and etching, semiconductors, pharmaceutical manufacture. It is used in the manufacture of fertilisers and other organic chemicals, in the printing industry for photoengraving, in jewellery manufacturing, and for wet chemical etching.

## ROUTES OF EXPOSURE

- Industry sources: Released from industries producing, using or handling nitric acid, for example chemical plants, metal, electronic, printing, glass, rubber and plastics plants and industries. Where ever very high temperature combustion takes place in the atmosphere in the presence of nitrogen, oxygen and water. May be present in small amounts in some wastewater from intensive farm factories and other facilities, which produce wastewater containing high level of nitrogen.
- Diffuse sources: May be present in exhaust gases from motor vehicles, the exhaust of incinerators or other chemical plants, or where these are in contact with moisture in the air. Unlikely to persist in nature because it readily reacts with a wide variety of naturally occurring substances.
- Natural sources: Rare in nature as a gas in the atmosphere, in groundwater around active volcanic regions, or drainage from areas where accumulated organic or animal wastes are present.
- Transport sources: Exhaust chambers in motor vehicles.

**Nitric acid, also known as aqua fortis and spirit of niter, is a highly corrosive strong mineral acid with the molecular formula  $\text{HNO}_3$ .**

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- Consumer products: Could be retained as small amounts in products where it has been used in the manufacturing or treatment process.

The major routes of exposure to nitric acid are:

- inhalation,
- ingestion,
- skin and/or eye contact

### HEALTH EFFECTS [4]

#### Acute Effects

- Nitric acid is irritating and corrosive to all tissues with which it comes into contact. The severity of effects is dependent upon concentration and duration of exposure.
- Acute inhalation of nitric acid vapour can lead to symptoms such as ocular and nasal irritation, sore throat, cough, chest tightness, headache, ataxia and confusion
- In severe cases, pulmonary oedema may develop hours or days following exposure
- Acute ingestion may cause burns to the oesophagus and stomach, which can include ulceration, haemorrhage and perforation. Abdominal pain, difficulty swallowing, nausea, salivation, vomiting, diarrhoea and haematemesis may also occur, and in some cases may be fatal
- Dermal exposure may result in deep burns, blisters and permanent scarring
- Ocular exposure may cause corneal burns, lacrimation, conjunctivitis, photophobia and, in severe cases, could lead to permanent blindness

#### Chronic Effects

- Chronic inhalation exposure to nitric acid can cause respiratory irritation, leading to bronchitis and airways hyperreactivity and erosion of dental enamel.
- Chronic ingestion is unlikely due to the adverse effect of acute ingestion
- Dermal exposure to low concentrations of nitric acid can result in dermatitis
- Nitric acid is not considered to be carcinogenic or mutagenic

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### SAFETY [5]

#### First Aid Measures

- Eye Contact: Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.
- Skin Contact: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.
- Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.
- Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
- Serious Inhalation: Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.
- Ingestion: Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

#### Fire & Explosion Information

##### Flammability Information

Nitric acid is flammable in the presence of cellulose or other combustible materials. Phosphine, hydrogen sulphide, selenide all ignite when fuming nitric acid is dripped into gas. Phosphine ignites in concentrated nitric acid. Nickel tetraphosphide ignites with fuming nitric acid. Contact with metals may evolve flammable hydrogen gas. A jet of ammonia will ignite nitric acid vapour. Cellulose may be converted to the highly flammable nitrate ester on contact with the vapour of nitric acid as well as the liquid.

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### Explosion Information

Nitric acid reacts explosively with metallic powders, carbides, cyanides, sulphides, alkalis and turpentine. Can react explosively with many reducing agents. Arsine, phosphine, tetraborane all oxidised explosively in presence of nitric acid. Caesium and rubidium acetylides explode in contact with nitric acid. Explosive reaction with Nitric Acid + Nitrobenzene + water. Detonation with Nitric Acid + 4-Methylcyclohexane. The addition of warm fuming nitric acid to phosphine causes explosion. Addition of water to nitration mixture diluted with an equal volume of water can cause a low order explosion. Cyclopentadiene reacts explosively with fuming nitric acid. Mixtures of fuming nitric acid and acetonitrile are high explosives. (Nitric acid, fuming).

### Exposure Controls & Personal Protection

#### Engineering Controls

Exhaust ventilation or other engineering controls should be provided to keep the airborne concentrations of vapours below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the workstation location.

#### Personal Protective Equipment

The following personal protective equipment is recommended when handling nitric acid:

- Face shield;
- Full suit;
- Vapour respirator (be sure to use an approved/certified respirator or equivalent);
- Gloves;
- Boots

Personal Protective Equipment in Case of a Large Spill:

- Splash goggles;
- Full suit;
- Vapour respirator;
- Boots;
- Gloves;
- A self-contained breathing apparatus should be used to avoid inhalation of the product.

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- Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

### REGULATION

#### United States [3]

NIOSH: The National Institute for Occupational Safety & Health has established a Recommended Exposure Limit (REL) for nitric acid of TWA 2 ppm (5 mg/m<sup>3</sup>) and short-term concentrations of 4 ppm (10 mg/m<sup>3</sup>)

OSHA: The Occupational Safety and Health Administration has set a Permissible Exposure Limit (PEL) for nitric acid of TWA 2 ppm (5 mg/m<sup>3</sup>)

#### Australia [2]

Safe Work Australia: Safe Work Australia has established a time weighted average concentration of less than 5.2 milligrams per cubic metre of air in an 8-hour period. Short-term exposure over a 15-minute period of no more than 10 mg/m<sup>3</sup> air is recommended.

### REFERENCES

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**Immunity to COVID-19 may persist six months or more**

2020-11-24

As coronavirus cases in the United States and around the world rise, scientists are uncovering hints that immunity for those who have had COVID-19 can last at least six months, if not longer.

After people with COVID-19 have largely recovered, immune proteins called antibodies are still detectable six months later. What's more, the proteins have sharpened their skills at fighting the coronavirus, researchers report in a preliminary study posted November 5 at bioRxiv.org. Leftover pieces of the virus remaining in the gut after symptoms have disappeared may help the immune system work to refine that response.

The finding also bodes well for how long a vaccination might provide protection. Immunity from a vaccine is expected to last as long or longer than natural immunity.

Antibodies, which are immune proteins that bind to microbes to fight off an infection, are part of the body's cache of immune defenses. People typically make a wide variety of antibodies during an infection. These proteins can recognize different surfaces on viruses — like a Swiss Army knife able to work on various parts of the virus — and evolve over time to better recognize their target (SN: 4/28/20).

Six months after an infection with the coronavirus that causes COVID-19, called SARS-CoV-2, people appear to have built an arsenal of antibodies that are not only more potent than the ones developed early on, similar to what has been seen in other infections. Those antibodies can also recognize mutated versions of the virus, researchers found. In addition to antibody upgrades, long-lasting immune cells that make antibodies, called memory B cells, stick around in the blood, poised to launch a rapid response should people be exposed to the virus again.

"The main message is that the immune response persists," says Julio Lorenzi, a viral immunologist at the Rockefeller University in New York City. "We see these B cells surviving over time and the antibodies six months after infection are even better than the beginning of the infection."

In the study, Lorenzi and colleagues analyzed the antibodies that 87 people made against the coronavirus at one and six months after developing symptoms. Although antibody levels in the blood waned, the immune proteins were still detectable after six months. Importantly, levels

**Those antibodies can also recognize mutated versions of the virus, researchers found.**

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of memory B cells were stable, an assessment of 21 of the 87 participants showed — a sign that those cells may remain in the body for a while.

Other studies have hinted that B cells can persist for more than six months in recovered COVID-19 patients. Preliminary results of one study uncovered that memory B cells — as well as other cells involved in immune memory known as T cells — decline slowly in the blood, researchers reported November 16 at bioRxiv.org. That slow decrease could mean that immunity might last for years, at least in some people (SN: 10/19/20).

What's more, Lorenzi and his team found, B cells refined the antibodies they made over a five-month time span to generate proteins that are better at recognizing the coronavirus. In an analysis of cells from six people, the researchers discovered changes in the genetic instructions that B cells use to make antibodies, a sign that the B cells were making new variations.

Some of the newer antibodies were better at stopping viruses from infecting new cells, and some could even attach to viruses with mutations in the spike protein, which helps the coronavirus break into host cells. Such widely binding antibodies could make it harder for the virus to escape recognition by the immune system.

The findings are encouraging, experts say, although it's still unclear whether people with signs of immunity such as antibodies are completely protected from reinfection — called sterilizing immunity — or whether they would just become less severely ill if reinfected.

"When the first studies started coming out about antibody responses to SARS-CoV-2, everyone was in an uproar about the response being potentially defective," says Nina Luning Prak, an immunologist at the University of Pennsylvania. Earlier results had hinted that antibody-generating B cells were poorly trained to make the immune proteins, perhaps because structures called germinal centers that teach the cells what parts of a virus the antibodies should bind to didn't properly form.

That may have left it up to other immune signals besides germinal centers to activate B cells, leading to the production of less effective antibodies that might latch onto parts of the virus weakly. "As a result, [some scientists thought that] perhaps [B cells] made antibodies that were not so great," Luning Prak says.

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But that may be part of a normal immune response, Luning Prak says. Or defective germinal centers might appear in the most severe COVID-19 cases where “it’s an all-hands-on-deck style immune response” with lots of inflammation. When people survive the infection, researchers are now beginning to find that “when you look [at COVID-19 patients] six months out, antibody responses look far more conventional,” she says.

B cells may learn how to make better SARS-CoV-2 antibodies over time, with the help of a store of viral proteins that stays hidden in the gut after the virus is cleared from the rest of the body. Since the pandemic’s early days, researchers have documented the presence of coronavirus genetic material in the stool of some infected people.

In the new study, seven of 14 recovered COVID-19 patients had evidence of coronaviruses in their intestinal tissue, the researchers found. Electron microscopy images of a sample from one patient revealed what look like intact virus particles adorned with a crown of spike proteins, a distinctive feature of coronaviruses.

Right now, it’s unclear whether the viral bits seen in the gut are in fact helping the immune system evolve to better recognize the coronavirus, much less whether those pieces come from infectious or dead viruses, Lorenzi says. “That’s a possibility,” but researchers need to study more people to figure that out.

[sciencenews.org](https://www.sciencenews.org), 24 November 2020

<https://www.sciencenews.org>

### Could we ever pull enough carbon out of the atmosphere to stop climate change?

2020-11-21

Nature has equipped Earth with several giant “sponges,” or carbon sinks, that can help humans battle climate change. These natural sponges, as well as human-made ones, can sop up carbon, effectively removing it from the atmosphere.

But what does this sci-fi-like act really entail? And how much will it actually take — and cost — to make a difference and slow climate change?

Sabine Fuss has been looking for these answers for the last two years. An economist in Berlin, Fuss leads a research group at the Mercator Research Institute on Global Commons and Climate Change and was part of the original Intergovernmental Panel on Climate Change (IPCC) — established

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by the United Nations to assess the science, risks and impacts of global warming. After the panel’s 2018 report and the new Paris Agreement goal to keep global warming to 2.7 degrees Fahrenheit (1.5 degrees Celsius) or less, Fuss was tasked with finding out which carbon removal strategies were most promising and feasible.

PLAY SOUND

Afforestation and reforestation — planting or replanting of forests, respectively — are well known natural carbon sinks. Vast numbers of trees can sequester the greenhouse gas carbon dioxide (CO<sub>2</sub>) from the atmosphere for photosynthesis, a chemical reaction that uses the sun’s energy to turn carbon dioxide and water into sugar and oxygen. According to a 2019 study in the journal *Science*, planting 1 trillion trees could store about 225 billion tons (205 billion metric tons) of carbon, or about two-thirds of the carbon released by humans into the atmosphere since the Industrial Revolution began.

Agriculture land management is another natural carbon removal approach that’s relatively low risk and already being tested out, according to Jane Zelikova, terrestrial ecologist and chief scientist at Carbon180, a nonprofit that advocates for carbon removal strategies in the U.S. Practices such as rotational grazing, reduced tilling and crop rotation increase carbon intake by photosynthesis, and that carbon is eventually stored in root tissues that decompose in the soil. The National Academy of Sciences found that carbon storage in soil was enough to offset as much as 10% of U.S. annual net emissions — or about 632 million tons (574 million metric tons) of CO<sub>2</sub> — at a low cost.

But nature-based carbon removal, like planting and replanting forests, can conflict with other policy goals, like food production, Fuss said. Scaled up, these strategies require a lot of land, oftentimes land that’s already in use.

This is why more tech-based approaches to carbon removal are crucial, they say. With direct air capture and carbon storage, for instance, a chemical process takes carbon dioxide out of the air and binds it to filters. When the filter is heated, the CO<sub>2</sub> can be captured and then injected underground. There are currently 15 direct air capture plants worldwide, according to the International Energy Agency. There’s also bioenergy with carbon capture. With this method, plants and trees are grown, creating a carbon sink, and then the organic material is burned to produce heat or fuel known as bioenergy. During combustion, the carbon emissions are captured and stored underground. Another carbon capture trick involves mineralization; in this process, rocks get ground up to increase the

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surfaces available to chemically react with, and crystallize, CO<sub>2</sub>. Afterward, the mineralized CO<sub>2</sub> is stored underground.

However, none of these technologies have been implemented on a large scale. They're extremely expensive, with estimates as high as \$400 per ton of CO<sub>2</sub> removed, and each still requires a lot of research and support before being deployed. But the U.S. is a good example of how a mix of carbon removal solutions could work together, Zelikova said: Land management could be used in the agricultural Midwest; basalt rocks in the Pacific Northwest are great for mineralization; and the oil fields in the Southwest are already primed with the right technology and skilled workers for underground carbon storage, she said.

Ultimately, every country will have to put together its own unique portfolio of CO<sub>2</sub> removal strategies because no single intervention will be successful on its own. "If we scaled up any of them exclusively, it would be a disaster," Fuss said. "It would use a lot of land or be prohibitively expensive." Her research has shown that afforestation and reforestation will be most productive in tropical regions, whereas solar radiation differences in the more northern latitudes with more albedo (reflection of light back into space) mean those countries will likely have better luck investing in the more technological interventions, such as carbon capture and biomass extraction.

The need to deploy these solutions is imminent. The global carbon budget, the amount of CO<sub>2</sub> humans can emit before the global temperature rises 2.7 F (1.5 C) above preindustrial levels, is about 300 gigatons of CO<sub>2</sub>, Fuss said.

"In recent years, we've emitted 40 gigatons," she said. Put another way, only a few years are left in that budget. A recent study in the journal *Scientific Reports* suggests that waiting even a few years from now may be too late if we are to meet the goal set in the Paris Agreement. Based on their climate model, the authors predict that even if we stop emitting greenhouse gases entirely, "global temperatures will be 3 C [5.4 F] warmer and sea levels 3 meters [10 feet] higher by 2500 than they were in 1850." To reverse climate change's effects, 33 gigatons of existing greenhouse gases must be removed this year and every year moving forward, the researchers said.

The reality, however, is these approaches are not ready and there's not a consensus on how to pay for them. There is a consensus among scientists on the next step: We need to stop further emissions immediately. But,

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"since emissions are embedded in our daily lives and infrastructure," Fuss said, "[carbon] removal comes more to the forefront."

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[livescience.com](https://www.livescience.com), 21 November 2020

<https://www.livescience.com>

### Elephants can lose two bathtubs full of water in a single day when it gets hot

2020-11-25

When the weather is warm, elephants can lose up to 10% of all the water in their bodies in a single day, according to a new study. That's the equivalent of nearly two bathtubs full, the highest volume of daily water loss ever recorded in a land animal.

The findings won't mean much for zoo elephants, which generally "live a pampered life," says Baptiste Mulot, an elephant behavior researcher at ZooParc de Beauval, a French zoological park. But Mulot, who was not involved with the work, has deep concerns about elephants in the wild, especially as the world warms. For a species that's already at risk of extinction, lack of access to water, he says, could lead to lower birth rates, reduced milk for baby elephants, and dehydration-related deaths.

Elephants need hundreds of liters of water every day. But it's unclear how climate change will alter their water needs.

So in the new study, researchers led by Corinne Kendall looked at five African savanna elephants (*Loxodonta africana*) at the North Carolina Zoo, where she works as a conservation biologist. On six occasions over 3 years, the team fed the animals precise doses of deuterium—a harmless heavier version of hydrogen that dilutes in body water and can be traced in the animals' fluids. The scientists regularly drew blood samples for 10 days after the deuterium dosing to see how much was left each time, indicating how fast the elephant was eliminating body water.

The results were "astonishing," Kendall says. In cool temperatures (from 6°C to 14°C), males lost an average of 325 liters per day. But around 24°C, they lost an average of 427 liters, and sometimes up to 516 liters, the team reports this week in *Royal Society Open Science*.

That's as much as 10% of their total body water—or up to 7.5% of their body mass. One elephant lost nearly 9% of his body mass in a single

**Elephants need hundreds of liters of water every day.**

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day, says study co-author Rebecca Rimbach, an ecophysiologicalist at Duke University. Because animals constantly replenish lost fluids through drinking, eating, and metabolic processes, though, the elephants' net daily water loss would be lower. Overall, elephants must drink at least every 2 to 3 days to avoid "potentially dangerous levels of dehydration," she says.

"This is surprising when you consider that these are animals that have adapted to living in the African savanna," Kendall says.

Horses in a hot environment can lose 40 liters in a day—about 6% of their body mass—and humans typically expend about 3 to 5 liters—about 5% of our body mass, although that can nearly double when active people, like marathon runners or soldiers, are really sweating.

As global temperatures climb, wild elephants will need more water. Yet it will become scarcer as watering holes dry up and water-rich plants become rarer. That could worsen conflict between wild elephants and human populations for resources, says co-author Erin Ivory, an elephant behaviorist at the North Carolina Zoo. When elephants raid crops or destroy underground water infrastructures, she says, violent confrontations can be deadly for both species.

"But the problem is far more extensive than that," Mulot adds. An increasingly dry and hot southern Africa will affect the water needs of a wide variety of animals, he says. "With competition for resources in the face of global warming, we're in the process of pushing out all the animal and plant species in that entire zone."

sciencemag.org, 25 November 2020

<https://www.sciencemag.org>

### Megalodon was a megalomom

2020-11-24

Megalodon, the largest shark that ever lived, was a fierce predator in prehistoric seas, with a bite force five times as strong as today's great white. But it was also a wise mother, new research reveals. An analysis of megalodon teeth found from sites across multiple continents suggests these giants commonly used nurseries to improve their youngsters' chances of survival, just as some modern sharks do.

It is an "exciting" possibility, says Kenshu Shimada, a paleobiologist at DePaul University who wasn't involved with the work. Still, he says, more research is needed to confirm the findings.

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Many modern marine animals, from shrimp to sharks, rely on nurseries. These shallower areas, such as mangroves and seagrass, are rich with nutrients, which help young grow big and strong enough to survive out on their own.

In 2010, researchers led by Catalina Pimiento, a paleobiologist at Swansea University, found possible evidence of a megalodon nursery off the coast of Panama. A number of juvenile megalodon teeth—the only remains the sharks left behind in the fossil record, as their skeletons were made of cartilage—at the 10-million-year-old site suggested youngsters may have lived there. But it was unclear whether the finding was a one-off or such nurseries were widespread.

In the new study, a separate team began to analyze a previously unexamined collection of 25 seemingly small megalodon teeth, all found in the past 20 years in northeastern Spain. They calculated that the teeth belonged to sharks as small as 2.6 meters, dating back to 15 million years ago. That's less than one-quarter of the size of a full-grown megalodon, which could grow up to 15 meters, roughly the length of a humpback whale. The geology and other fossilized fauna where the specimens were found suggested it was once a shallower coastal area, notes study leader Carlos Martínez-Pérez, a paleobiologist at the University of Valencia, further indicating this could be a nursery site for young megalodons.

The researchers then gathered data on 485 megalodon teeth from eight other locations in the Pacific Ocean, Caribbean Sea, and the Atlantic Ocean. They estimated the sizes of the sharks and the known geographical history and paleoecology of the area. Four additional locations turned out to be potential nurseries 16 million to 3.6 million years ago, the team reports today in *Biology Letters*. "It puts everything into a global context," Pimiento says.

The megalodon's apparent reliance on nurseries brings up new ideas about what drove the great shark to extinction more than 3 million years ago, Martínez-Pérez says. Shoreline loss during that time may have reduced the availability of shallower, protected environments that baby megalodon relied on for survival, he speculates, perhaps driving the species to the brink.

sciencemag.org, 24 November 2020

<https://www.sciencemag.org>

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**The FDA has approved the first drug to treat the rapid-aging disease progeria**

2020-11-25

The U.S. Food and Drug Administration has approved a treatment that could give children with a rare genetic illness that causes premature aging more time to live.

Children with the disease, known as Hutchinson-Gilford progeria syndrome, or progeria for short, often die of heart failure, heart attack or stroke as teenagers. Most children with the disorder die before they reach age 15. The newly approved drug, called Zokinvy, is the first and only approved treatment for progeria and certain related syndromes, the FDA announced November 20.

In clinical trials of 62 children receiving the drug, Zokinvy increased life span by about 3 months on average during the first three years of treatment, compared with another 81 kids who did not take the drug from a separate study that collected their health data. Following children who continued to receive Zokinvy for up to 11 years showed that, on average, kids' life spans were lengthened by about 2.5 years.

"This is not a cure," cautions Monica Kleinman, a pediatric critical care doctor at Boston Children's Hospital who was involved with the clinical trials. "We've hopefully extended the life span that [the children] have by slowing the pace of the disease," but, she says, the drug doesn't give kids a normal length of life.

An estimated 350 to 400 kids across the world have progeria. For these children, a single mutation in their genetic code upends their health (SN: 2/7/13). That mutation interferes with the gene responsible for making the protein lamin A, which helps hold cells' nuclei together. Children with progeria end up with higher amounts of a defective protein called progerin, which is similar to lamin A but with an extra piece attached. This protein gets stuck in cells' membranes and can't be recycled for fresh proteins, causing the cells to prematurely age and making blood vessels and connective tissue stiffer, Kleinman says.

Everyone makes some progerin, and the body makes more as it gets older, Kleinman explains, but "children with progeria make a huge amount." Children typically appear normal at birth, but start to show signs of the illness in their first two years of life. Over their lives, these kids experience loss of hair and body fat, joint stiffness, cardiovascular disease and other symptoms of accelerated aging.

**"We've hopefully extended the life span that [the children] have by slowing the pace of the disease," but, she says, the drug doesn't give kids a normal length of life.**

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Zokinvy, made by the company Eiger BioPharmaceuticals of Palo Alto, Calif., blocks some of that progerin production, lowering the amount that accumulates in kids' cells. But the oral drug, taken as capsules, doesn't fully block production, she says, and the amount that patients can receive is limited by the drug's side effects, which include vomiting, diarrhea and fatigue.

The drug is a "testament to the power of basic research," says Tom Misteli, a cell biologist at the National Cancer Institute in Bethesda, Md, who was not involved with work on the drug. Zokinvy builds on decades of research on many aspects of the lamin A protein, including the "seemingly esoteric chemical modification" that forms progerin, he says.

"Nobody studying this protein or the modification could have expected it to become a drug target," Misteli adds. But once the disease-causing gene was identified, researchers zeroed in on the class of drugs that includes Zokinvy as potential treatments.

With the new drug approval, the focus is now to test additional drugs or therapeutics in combination with Zokinvy, Misteli says. That could help lengthen the lives of children with progeria even further. Researchers are also investigating gene therapy approaches, with the goal of fixing the mutation that causes the debilitating illness.

sciencenews.org, 25 November 2020

<https://www.sciencenews.org>

**Californian cave artists may have used hallucinogens, find reveals**

2020-11-23

With recurring zigzags, spirals, and other simple geometric patterns, ancient rock art is sometimes surprisingly similar across the globe. One hypothesis is that the artists were all using psychoactive compounds, which nudged the brain toward certain patterns. Now, a new find from a roughly 500-year-old cave used by Native Americans suggests such compounds may indeed have been an important component of their rock art. But the art itself may not have depicted the experience of tripping.

"They have broken away from the ludicrous school of thought ... which saw all rock art as trance imagery produced by shamans," says Paul Bahn, an archaeologist at Archaeological Institute of America who was not involved in the research.

**"I was like, 'Wow, we found the smoking gun of hallucinogens at a rock art site,'" Robinson says.**

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The site of the discovery is Pinwheel Cave in Southern California, about 80 kilometers northeast of Santa Barbara. The cave gets its name for a large, red, pinwheel-shaped drawing on its ceiling; some archaeologists have hypothesized it represents a genus of the psychoactive flower *Datura*. The flower contains the alkaloids scopolamine and atropine, which are considered an entheogen—a psychoactive compound used in a spiritual context. The Chumash people of Southern California called the experiences triggered by ingesting *Datura* “sacred dreams,” according to Jim Adams, a pharmacologist at the University of Southern California who spent 14 years studying sacred Chumash *Datura* ceremonies.

When David Robinson, an archaeologist at the University of Central Lancashire, and his colleagues began to excavate the site in 2007, they found chewed remnants of plant materials—also known as quids—pushed into cracks in the ceiling of the cave. Initial attempts to extract DNA from the quids came up short. But now, a combination of new chemical analyses and electron microscopy has positively identified the plant as *Datura*, the team reports today in the Proceedings of the National Academy of Sciences. “I was like, ‘Wow, we found the smoking gun of hallucinogens at a rock art site,’” Robinson says.

Sandra Hernandez, a Tejon tribal member who helped coordinate research for the new paper, agrees with the interpretation that the art represents the *Datura* flower. “I kind of marveled at the shapes that they captured in the rock art compared to the actual flower unfurling,” she says.

The excavation also uncovered a plethora of arrowheads, tools, and food scraps at the site, contradicting a once-classic model of a lone shaman hallucinating in isolation and using rock art to record his experience, as had been suggested for ancient rock art around the world.

The study argues the art may not be a depiction of the user’s experience of the *Datura*, but rather a message to the community regarding the plant’s importance. “The painting ... is them representing the plant that causes the hallucinogenic experience—not the vision that is caused by the plant,” Robinson explains. “They’re venerating the plant, saying, ‘That plant’s cool!’”

The idea that anyone could create rock art while under the influence of *Datura* is questionable, says Adams, who was not involved with the work.

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“I’ve never tried painting under the influence, but personally I think I would find it difficult.”

sciencemag.org, 23 November 2020

<https://www.sciencemag.org>

### Cocoa farming, cheap chocolate and child labor

2020-11-25

“The road to hell is paved with good intentions,” according to a famous proverb. And there is indeed no lack of good intentions to eradicate child labor in cocoa farming.

But despite decades of promises, success is still a long way off, as a new study by the NORC research institute at the University of Chicago shows.

Around 1.6 million children in the two largest cocoa-growing countries, Ivory Coast and Ghana, work in cocoa farming, the study reports. Together the two nations produce around two-thirds of the world’s cocoa beans.

On every second cocoa farm there, children as young as five have to pitch in instead of going to school because their parents are too poor to hire farm hands. Children are even used for more dangerous work, such as weeding or harvesting with machetes.

Two decades of promises

For some 20 years now, major chocolate manufacturers like Mars and Nestle have promised to end the worst forms of child labor. They even set themselves clear goals and deadlines by signing the Harkin-Engel Protocol in 2001.

When the targets were missed, they were repeatedly postponed and adjusted. “In 2005, the deadline was extended to 2008, and then in 2008 to 2010,” said Johannes Schorling from Inkota, a development policy network based in Berlin.

In 2010, a revised target was announced to reduce child labor by 70% come 2020. “That hasn’t happened either, on the contrary child labor has actually increased over the last 10 years,” Schorling told DW.

According to the NORC study, the use of child labor is now at 45%, an increase of 14 points. Given the goal of a 70% reduction, such an increase might well be termed a complete failure.

Too ambitious?

**According to the NORC study, the use of child labor is now at 45%, an increase of 14 points.**

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Industry representative Richard Scobey prefers to put it more mildly. "Child labor remains a persistent problem — and the targets we had set in 2010 were not fully realized," he told DW.

Scobey is president of the World Cocoa Foundation (WCF), an organization of about 100 leading companies in the industry, including cocoa processors such as Barry Callebaut (Switzerland), Olam International (Singapore) and Cargill (US). It also includes chocolate manufacturers like Nestle (Switzerland), Mars and Hershey (both USA) and retailers such as Starbucks.

According to Scobey, the target was not missed because the industry lacked commitment, but because the target was too ambitious.

"The NORC study acknowledges that the target was not realistic," said Scobey. When the goal was set back in 2010, it "was not set with an understanding of the complexity and scale of the challenge, which is heavily driven by poverty, traditional norms and customs, weaknesses in the labor markets, and poor social and economic infrastructure."

Scobey also points out that while cocoa production has grown by 60% within the last decade, child labor has increased at a lower rate.

Not productive enough?

But nowadays, much more is known about how to stop child labor, says Scobey, thanks to academic studies such as the one done by NORC (paid for by the US Department of Labor). The industry is already funding numerous programs to address the problem, he adds.

This is true, says Schoring from the NGO network Inkota. "But given that the promise to solve this problem was made 19 years ago, far too little is being done."

A big problem for farmers is the low price cocoa fetches on world markets. In recent years, a ton of cocoa beans brought in just over \$2,000 (€1,680), only half of the price it fetched in the 1970s.

The farmers must therefore be more productive, says the WCF president. "The biggest investment of the industry in the past 10 years has been around boosting farmers' yields and profitability," said Scobey, adding that sustainable farming methods were rewarded with bonus payments.

But all this did little to increase incomes and lower the prevalence of child labor, said Inkota's Schorling. "That's why we have to talk about fair prices."

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What is a fair price?

And this is where it gets complicated. Market forces alone seem unable to ensure that farmers can actually secure a livelihood. It takes years for cocoa trees to produce good yields, so farmers cannot just grow something else when prices fall.

Farmers are also the weakest link in the global value chain. They receive only a tiny fraction of what customers pay for a bar of chocolate. Most of the money goes to the chocolate companies and retail chains, which are mostly based in the US and Europe, and increasingly in Asia.

Last year, Ghana and Ivory Coast forged what was called "the Opec for cocoa." Since this October, buyers of their cocoa beans have to pay a premium of about \$400 per ton.

The industry, which had previously opposed higher prices, now supports this living income differential. "This will generate an estimated \$1.2 billion in additional revenue for cocoa farmers," said Scobey.

"These two governments have done more for fairer prices than the industry has done in years," said Schorling.

But how exactly the markup will affect farmers' incomes has yet to be investigated. Before its introduction, cocoa farmers in Ivory Coast earned only \$0.78 a day on average, according to a study by Fairtrade, an NGO, compared with a living wage of \$2.51.

Does a supply chain law help?

After repeatedly failing to meet its own goals to end child labor, the cocoa industry is no longer setting concrete reduction targets. But it continues to focus on increasing yields.

Over the next five years, large companies plan to train all farmers in their supply chains to become more productive. The industry also wants to expand programs in which cocoa farmers themselves monitor child labor in their villages and provide education. By 2025, these programs are to cover 100% of the supply chains in Ghana and Ivory Coast, compared to only 20% today.

Further studies will then have to show whether these goals were achieved — and, more importantly, whether they actually help reduce child labor.

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Inkota and other NGOs doubt that voluntary commitments by industry will suffice. They are also lobbying for a supply chain law that would make companies liable for what happens in their supply chains.

In Germany, no such law has yet been passed. But years of debate have created a long list of declarations of good intentions. You could almost pave a road with it.

dw.com, 25 November 2020

<https://www.dw.com>

### More than 3 billion people affected by water shortages, data shows

202-11-27

Water shortages are now affecting more than 3 billion people around the world, as the amount of fresh water available for each person has plunged by a fifth over two decades, data has shown.

About 1.5 billion people are suffering severe water scarcity or even drought, as a combination of climate breakdown, rising demand and poor management has made agriculture increasingly difficult across swathes of the globe.

The UN warned on Thursday that billions of people would face hunger and widespread chronic food shortages as a result of failures to conserve water resources, and to tackle the climate crisis.

Qu Dongyu, director-general of the UN's Food and Agriculture Organization (FAO), said: "We must take very seriously both water scarcity (the imbalance between supply and demand for freshwater resources) and water shortages (reflected in inadequate rainfall patterns) for they are now the reality we all live with ... Water shortages and scarcity in agriculture must be addressed immediately and boldly."

He said that the UN's sustainable development goals, which include wiping out hunger and improving access to clean water, were still within reach but that much more needed to be done to improve farming practices around the world and to manage resources equitably.

The organisation's State of Food and Agriculture 2020 report found that 50 million people in sub-Saharan Africa live in areas where severe drought has catastrophic effects on cropland and pastureland once every three

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years. More than a 10th of the world's rainfed cropland is subject to frequent drought, as is about 14% of the world's pastureland.

Rainfed agriculture represents 60% of global crop production, and 80% of land under cultivation, with the rest benefiting from irrigation. However, irrigation is no panacea: more than 60% of irrigated cropland around the world is highly water stressed. Irrigation of the wrong type can waste water, depleting non-renewable resources such as underground aquifers, and poor management can result in some farmers losing out on water resources – for instance, in the case of downstream farms, if rivers and waterways are run dry by upstream irrigation.

Small-scale and farmer-led irrigation systems are often more efficient than large-scale projects, the report found. Large-scale state-funded schemes in Asia, for instance, have relied on tapping directly into groundwater, putting excessive pressure on that resource. But small-scale farmers around the world face extra difficulties, such as a lack of secure tenure over water rights, and little access to finance and credit.

Separate research has recently shown that the world's farmland is increasingly being concentrated in fewer hands, with large companies and international owners taking over swathes of production, while small farmers – whose farms are often run along more environmentally sustainable lines – are increasingly being pushed out. About 1% of the world's farms operate 70% of the world's farmland.

Food production must change in order to reduce greenhouse gas emissions and try to stave off climate breakdown, but even this is not straightforward, the FAO warned. "As the world aims to shift to healthy diets – often composed of relatively water-intensive foods, such as legumes, nuts, poultry and dairy products – the sustainable use of water resources will be ever more crucial," said Qu, former vice-minister of agriculture and rural affairs in China. "Rainfed agriculture provides the largest share of global food production. However, for it to continue to do so, we must improve how we manage water resources from limited rainfall."

This year's FAO report focused on water, but much of the organisation's work this year has been to try to stem the potential for the coronavirus pandemic to give rise to widespread food shortages. The organisation called on governments earlier this year to keep global supply chains and food markets open, despite the travel restrictions resulting from the pandemic, and these calls seem to have largely been heeded.

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The world's harvests this year have generally been good, with some exceptions, but some areas of Africa are still under threat of severe food problems.

tehguradian.com, 27 November 2020

<https://www.theguardian.com>

### The dark side of Italian hazelnut farming

2020-11-23

As the early morning mist clears to reveal the turrets of San Quirico Castle in central Italy, the greenery surrounding local farmhouses comes alive with sound: Red-bellied woodpeckers chirp and bright-green tree frogs call to each other among the cypress and beech trees.

But walk a little further towards the fields of young hazelnut plantations and there is suddenly silence: the birds and insects have been driven away by the monoculture. Seemingly never-ending lines of saplings are now the defining feature of Alfina plateau which lies a few hundred meters above sea level. Until recently, much of this area was composed of wildflower fields and a patchwork of different crops.

"Six or seven years ago this place looked completely different," Gabriele Antoniella said. He works as a researcher and activist with Comitato Quattro Strade, a conservation organization in Alfina. Antoniella estimates there are around 300 hectares (741 acres) of new plantations in the area, mostly owned by a few large investors.

The plateau sits in the northern section of Tuscia, a historical region in Viterbo province and the heart of Italy's hazelnut production. Around 43% of the agricultural land in Viterbo is reserved for hazelnut orchards, the bulk of which goes to the confectionary industry for use in products such as nougat and chocolate.

The nuts have been grown for thousands of years in the southern part of Tuscia and have largely sustained its economy since production ramped up in the 1960s. But the intensification of monoculture practices and their expansion into new areas such as the Alfina plateau is an increasing concern for environmentalists.

Impact of monoculture on water, soil and air

Several diverse crops have been replaced by hazelnut plantations, and hedgerows have been cleared to minimize the presence of insects. As the

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nuts are harvested once they fall, the ground beneath the trees is also usually kept completely free of vegetation.

"For us the hazelnut represents a great resource, but it's cultivated in an unsustainable way," said Famiano Cruciarelli, president of the Biodistretto della Via Amerina e delle Forre, an environmental organization in southern Tuscia. "Hazelnut monoculture has caused problems with water, soil, and air."

The use of chemical fertilizers and pesticides treatments, he says, is making the soil increasingly arid, which in turn has led to its erosion in some places. And during harvest season, clouds of dust are kicked up into the air by the heavy machinery. "That dust is full of chemicals, which are a big problem for people's health," he said.

One of the most glaring examples of environmental degradation can be seen in a nearby volcanic lake encircled by decades-old hazelnut plantations.

"Large quantities of fertilizers have been used in the intensive hazelnut cultivation, and they have ended up in Lake Vico," explains Giuseppe Nascetti, a professor at the Tuscia University who has been studying the lake for over 25 years. This has caused the proliferation of so-called "red-algae," which produce carcinogenic chemicals harmful to environmental and human health.

Expansion of the industry

While the transformation towards monoculture has been underway for decades, environmentalists say the growing demand for hazelnuts from big companies and investors has further fueled this shift.

Italian manufacturer Ferrero Group, which makes the chocolate and hazelnut spread Nutella, doesn't own or run any farms in the region but is one of the biggest consumers of the nuts produced in Tuscia.

In 2018, the company launched its Progetto Nocciola Italia plan which aims — in cooperation with farming associations — to increase hazelnut plantations across Italy by 20,000 hectares by 2026. In Lazio — a region that includes Alfina plateau — the company is also working with local producers through a farming association in Lazio to develop 500 hectares for the crop over a five-year period. According to Ferrero's figures, 17,708 hectares are currently devoted to hazelnut cultivation in Viterbo, and 80,000 across Italy.

**Antoniella estimates there are around 300 hectares (741 acres) of new plantations in the area, mostly owned by a few large investors.**

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A Ferrero spokesperson said it was a company objective to integrate hazelnut shrubs with existing crops — and that organic production is neither an obligation nor prohibited.

They add the company is also working in collaboration with researchers including those at Tuscia University to “gain a better understanding of its environmental impact” and “enhance sustainability in hazelnut cultivation.”

Sustainable, organic agriculture

Yet as local farmer Anselmo Filesi has discovered, choosing a sustainable path isn't without its challenges.

In 2002, concerned about the environmental and health impacts of using pesticides, he converted his small 20-hectare hazelnut plantation in southern Tuscia to organic methods.

But it came at a cost. Filesi says he was no longer able to sell his products to the world's biggest buyers: Most confectionary multinationals require hazelnuts with little damage from shield bugs — a common pest which can cause shriveled kernels and a slightly bitter taste.

“This is very difficult to achieve with organic methods,” Filesi said. “If the hazelnuts are not perfect the market will not accept them.”

Filesi shells, toasts and packages his own produce before selling it directly to local shops and supermarkets. But he says it's harder for bigger farmers — which usually sell pre-processed nuts in bulk — to make the switch as they fear losing their biggest buyers.

The rush to invest in hazelnut plantations in the area is also increasing land prices, says Filesi, making it harder for small farmers like him to buy or rent land.

“Converting all hazelnut plantations to organic ones could be one way forward, but there is no incentive to do so,” said Professor Nascetti, citing a lack of commitment from big companies to pay good prices for organic produce. “Until sustainability is put before profit ... it's unlikely this will happen.”

“People do not imagine that behind a jar of hazelnut [spread] there is an environmental and social economic catastrophe,” Antoniella said. By staging protests against intensive agriculture, encouraging smallholder farmers to turn to organic farming and not to sell their land, activists hope to foster a new relationship between locals and the land.

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“We are not against hazelnuts, but against these agro-industrial methods that don't respect our land,” Antoniella said. “We want to show that things can be done differently, that agriculture can be based on respect for the environment.”

He glances at the endless lines of saplings and explains that once the trees grow, the striking view of San Quirico castle perched on a hill in the background will be obscured. “The landscape will change forever.”

dw.com, 23 November 2020

<https://www.dw.com>

### The biblical warrior Goliath may not have been so giant after all

2020-11-23

Early versions of the Bible describe Goliath — an ancient Philistine warrior best known as the loser of a fight with the future King David — as a giant whose height in ancient terms reached four cubits and a span. But don't take that measurement literally, new research suggests.

Archaeological findings at biblical-era sites including Goliath's home city, a prominent Philistine settlement called Gath, indicate that those ancient measurements work out to 2.38 meters, or 7 feet, 10 inches. That's equal to the width of walls forming a gateway into Gath that were unearthed in 2019, according to archaeologist Jeffrey Chadwick of Brigham Young University in Provo, Utah.

Rather than standing taller than any NBA player ever, Goliath was probably described metaphorically by an Old Testament writer as a warrior who matched the size and strength of Gath's defensive barrier, Chadwick said November 19 at the virtual annual meeting of the American Schools of Oriental Research.

People known as Canaanites first occupied Gath in the early Bronze Age, roughly 4,700 to 4,500 years ago. The city was rebuilt more than a millennium later by the Philistines, known from the Old Testament as enemies of the Israelites (SN: 11/22/16). Gath reached its peak during the Iron Age around 3,000 years ago, the time of biblical references to Goliath. Scholars continue to debate whether David and Goliath were real people who met in battle around that time.

The remains of Gath are found at a site called Tell es-Safi in Israel. A team led by archaeologist Aren Maeir of Bar-Ilan University in Ramat-Gan,

**But don't take that measurement literally, new research suggests.**

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Israel — who Chadwick collaborated with to excavate the Gath gateway — has investigated Tell es-Safi since 1996. Other discoveries at Gath include a pottery fragment inscribed with two names possibly related to the name Goliath. Evidence of Gath's destruction about 2,850 years ago by an invading army has also been recovered.

Archaeologists have long known that in ancient Egypt a cubit corresponded to 52.5 centimeters and assumed that the same measure was used at Gath and elsewhere in and around ancient Israel. But careful evaluations of many excavated structures over the last several years have revealed that standard measures differed slightly between the two regions, Chadwick said.

Buildings at Gath and several dozen other cities from ancient Israel and nearby kingdoms of Judah and Philistia, excavated by other teams, were constructed based on three primary measurements, Chadwick has found. Those include a 54-centimeter cubit (versus the 52.5-centimeter Egyptian cubit), a 38-centimeter short cubit and a 22-centimeter span that corresponds to the distance across an adult's outstretched hand.

Dimensions of masonry at these sites display various combinations of the three measurements, Chadwick said. At a settlement called et-Tell in northern Israel, for instance, two pillars at the front of the city gate are each 2.7 meters wide, or five 54-centimeter cubits. Each of four inner pillars at the city gate measure 2.38 meters wide, or four 54-centimeter cubits and a 22-centimeter span. Excavators of et-Tell regard it as the site of a biblical city called Bethsaida.

Chadwick's 2019 excavations found one of presumably several gateways that allowed access to Gath through the city's defensive walls. Like the inner pillars of et-Tell's city gate, Gath's gate walls measured 2.38 meters wide, or four cubits and a span, the same as Goliath's biblical stature.

"The ancient writer used a real architectural metric from that time to describe Goliath's height, likely to indicate that he was as big and strong as his city's walls," Chadwick said.

Although the research raises the possibility that Goliath's recorded size referred to the width of a city wall, Chadwick "will need to do more research to move this beyond an intriguing idea," says archaeologist and Old Testament scholar Gary Arbino of Gateway Seminary in Mill Valley, Calif. For one thing, Arbino suggests, it needs to be established that the

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measure applied to Goliath, four cubits and a span, was commonly used at the time as a phrase that figuratively meant "big and strong."

sciencenews.org, 23 November 2020

<https://www.sciencenews.org>

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**Why do some animals sleep so much?**

2020-11-21

A dog snoring away the afternoon on the living room floor. Walrus snoozing belly-up on a beach. Lions sprawled out on the Serengeti. A hippo dozing on a mudbank.

These slumberous scenes may make folks wonder why these other mammals seem to be getting so much more sleep than humans. Do they actually need more sleep? Are they just sleeping because they can? Should humans be sleeping more, too?

Be prepared for a surprising and fascinating answer to these questions:

Nobody knows. SOUND

Though constantly studied, sleep is one of the great mysteries modern science hasn't completely cracked. "We really don't know what sleep is for," Dr. David Raizen, associate professor of neurology at the University of Pennsylvania's Perelman School of Medicine, told Live Science.

Raizen said scientists have identified relationships between sleep and animal function — certain kinds of sleep can increase a critter's ability to fight off illness or consolidate memories. Yet these associations don't necessarily describe the ultimate purpose of sleep and can be misleading.

"A brown bat that sleeps 20 hours a day you'd think would be a genius," Raizen said, speaking to the idea that sleep is meant to serve learning and memory. Likewise, a 2017 study published in the journal PLOS One found that elephants sleep for an average of only two hours a night, but it's known elephants are intelligent animals with very good memories.

"This difference in sleep amounts has been used for arguments against a core function of sleep," Raizen said. How could sleep be so important if an animal like an elephant is perfectly functional with only two hours while a typical human needs quadruple that?

But Raizen thinks sleep does serve a core function, though an as-of-yet poorly understood one. Sleep has been observed in every animal ever studied by science, Raizen said, making it as universal across lifeforms as energy intake. Studies have also shown that various animals' bodies begin to break down if they're continuously sleep deprived, suggesting sleep is essential.

So if it's essential, why isn't more always better and the amount always similar, particularly across closely-related animals, like mammals?

**These slumberous scenes may make folks wonder why these other mammals seem to be getting so much more sleep than humans.**

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One idea is that sleep in mammals has to do with body size and diet, according to a 2005 study in the journal Nature. Across many studies of mammalian sleep, scientists have observed that less sleep is correlated with larger body sizes, and this correlation is stronger and more extreme among herbivores than it is among carnivores.

A reason for this may be that the larger an animal is, the more calories it needs, and the more time it needs to spend eating. Herbivores tend to rely on food that is far less calorie-dense than the food carnivores eat so need to gulp down much more. This could partly explain why an elephant may have evolved to survive on only two hours a day, Raizen said.

However, the matter is far from settled. Sleep is complex, hard to measure in wild animals and even harder to interpret.

Along those lines, it's important to remember that some differences in observed sleep might not be what they seem. Just because a house cat sleeps for 18 hours a day doesn't mean it needs all that sleep to function, Raizen said. Some sleep is probably a matter of convenience — done when it's not safe for an animal to be out and about, when food availability is low or simply because there's nothing else to do.

As for human sleep? Raizen said the most important thing is for people to listen to their bodies and get as much sleep as they feel they need — which is about eight hours for most folks but might be as few as five and as many as 11.

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[livescience.com](https://www.livescience.com), 21 November 2020

<https://www.livescience.com>

**These plants seem like they're trying to hide from people**

2020-11-20

Fritillaria plants should be simple to spot.

The usually bright green plants often stand alone amid the jumbled scree that tops the Himalayan and Hengduan mountains in southwestern China — easy pickings for traditional Chinese medicine herbalists, who've ground the bulbs of wild Fritillaria into a popular cough-treating powder for more than 2,000 years. The demand for bulbs is intense, since about

**"It's a nice first step toward demonstrating that humans seem to be driving the very rapid evolution of camouflage in this species."**

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3,500 of them are needed to produce just one kilogram of the powder, worth about \$480.

But some *Fritillaria* are remarkably difficult to find, with living leaves and stems that are barely distinguishable from the gray or brown rocky background. Surprisingly, this plant camouflage seems to have evolved in response to people. *Fritillaria delavayi* from regions that experience greater harvesting pressure are more camouflaged than those from less harvested areas, researchers report November 20 in *Current Biology*.

The new study “is quite convincing,” says Julien Renoult, an evolutionary biologist at the French National Centre for Scientific Research in Montpellier who wasn’t involved in the study. “It’s a nice first step toward demonstrating that humans seem to be driving the very rapid evolution of camouflage in this species.”

Camouflaged plants are rare, but not unheard of, says Yang Niu, a botanist at the Kunming Institute of Botany in China, who studies cryptic coloration in plants. In wide open areas with little cover, like mountaintops, blending in can help plants avoid hungry herbivores (SN: 4/29/14). But after five years of studying camouflage in *Fritillaria*, Niu found few bite marks on leaves, and he did not spot any animals munching on the plants. “They don’t seem to have natural enemies,” he says.

So Niu, his colleague Hang Sun and sensory ecologist Martin Stevens of the University of Exeter in England decided to see if humans might be driving the evolution of the plants’ camouflage. If so, the more heavily harvested a particular slope, the more camouflaged the plants that live there should be.

In an ideal world, to measure harvesting pressure “you’d have exact measures of exactly how many plants had been collected for hundreds of years” at multiple sites, Stevens says. “But that data is practically nonexistent.”

Luckily, at seven study sites, local herbalists had noted the total weight of bulbs harvested each year from 2014 to 2019. These records provided a measure of contemporary harvesting pressure. To estimate further back in time, the researchers assessed ease of harvesting by recording how long it took to dig up bulbs at six of those sites, plus an additional one. On some slopes, bulbs are easily dug up, but in others they can be buried under stacks of rocks. “Intuitively, areas where it’s easier to harvest should have experienced more harvesting pressure” over time, Stevens says.

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Both measures revealed a striking pattern: The more harvested, or harvestable, a site, the better the color of a plant matched its background, as measured by a spectrometer. “The degree of correlation was really, really convincing for both metrics we used,” Stevens says.

Human eyes also had a harder time spotting camouflaged plants in an online experiment, suggesting that the camouflage actually works.

Hiding in plain sight may present some challenges for the plant. Pollinators might have a harder time finding camouflaged plants, and the gray and brown coloration could impair photosynthetic activity. Still, despite those potential costs, these *F. delavayi* show just how adaptable plants can be, Steven says. “The appearance of plants is much more malleable than we might have expected.”

[sciencenews.org](https://www.sciencenews.org), 20 November 2020

<https://www.sciencenews.org>

## In search of a ‘regenerative’ Thanksgiving turkey

2020-11-23

On a sunny day in October, Heidi Diestel holds her iPad up to offer me a good look at a flock of pastured turkeys at Diestel Family Ranch. When they see her at the fence, the large, black-feathered birds start to crowd together and move toward her in unison, clucking and squawking as they approach.

This is what passes for a farm tour in the age of COVID. In addition to the turkeys—which will be sold whole, and make up about 1 percent of the business’s total sales this year—Heidi is gamely showing me a selection of other scenes at the 400-acre Diestel home ranch in Sonora, California. Highlights include the compost they make with their turkey waste and sell to local gardens and CSA farms, the goats they graze on the land between turkey flocks, the pasture grass that has started growing in extra thick and healthy ever since they started applying compost to it, and the old feed mill. The mill is left over from the days before Diestel Family Ranch began working with close to a dozen other farms situated throughout California and the Midwest to raise the majority of their turkeys.

Diestel is a rare mid-sized player in an industry dominated by a short list of large companies. Heidi estimates that the company produces about .5 percent of all the turkey products in the country—in 2019, that number was 240 million—meaning it’s not an insignificant player, but nowhere near the likes of Butterball, Hormel, or Cargill. (In a typical year, around 40

**(In a typical year, around 40 million turkeys are eaten on Thanksgiving, but this year, demand—and prices—appear to be down overall.)**

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million turkeys are eaten on Thanksgiving, but this year, demand—and prices—appear to be down overall.) Diestel also acquired Sonoma County brand Willie Bird early this year and has worked with General Mills to provide turkey for its Epic bars.

Ever since Heidi, her husband, Jared Orrock, and her brother Jason Diestel took over the company from their parents 13 years ago, she says they've been slowly changing the way they do things. And yet while the Diestels tout their regenerative practices prominently on their website and in marketing material, they don't yet include the term on their the label.

"We're trying to find the most authentic way to bring it to market," says Heidi. "We're not crop farmers, we're not testing our soil, and we're not raising cattle on thousands of acres. The full-circle process and the contribution that our organic material makes when we make it into a high-quality humus compost . . . that in itself is a regenerative process. Does it directly always impact the turkey farming piece of it? Not always."

Indeed, as popular as the term regenerative, and the thinking behind it, has become, truly regenerative turkey is a rare thing. And, as Diestel's efforts suggest, it's much less cut-and-dried than many consumers might think.

While regenerative agriculture still doesn't have one agreed-upon definition, its focus on repairing soil health and sequestering carbon has also shed light on the need to balance the nutrients that soil needs to stay healthy without causing pollution. When it comes to raising animals, that means creating a system that inverts the approach of conventional indoor poultry production, which results in loads of waste, and therefore loads of displaced nutrients.

So far, herbivorous ruminants have been a big part of the regenerative story because they can live on 100 percent grass and the other plants or forage that grow in a pasture. And for crop farmers building soil using cover crops, grazing has been an important way to turn those crops into revenue.

Poultry production, on the other hand, requires high-protein corn and soy feed. For this reason, experts say turkeys must be part of a larger regenerative farming system to warrant the term.

Cliff McConville of All Grass Farms in Dundee, Illinois, is one of several farmers raising a small flock of turkeys on pasture with other animals in a rotational grazing system popularized by the likes of the Savory Institute

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and Will Harris of White Oak Pastures. Located just outside Chicago, the farm has seen a spike in demand since the pandemic and McConville says he isn't worried about updating his labeling to incorporate the term regenerative—even if he's quick to apply it when describing their practices.

On the farm, chickens and turkeys follow cattle and hogs through a series of paddocks, eating bugs and grass and spreading the cows' manure around so it is more effectively absorbed into the soil. And while the birds get a good portion of their calories from the pasture, they also do a lot more running around, meaning they use up more calories than confined turkeys do. So the farm still needs to rely on corn and soy to get them to grow to the size most consumers are looking to buy, which—in a typical year—can be as large as 18 pounds.

"People come to us and say, 'I want a turkey that doesn't get any supplemental feed,'" says McConville. "And if I totally let them forage free range on 20 acres of pasture they might survive; but they're not going to be very fat."

McConville is still learning about the value turkeys bring to a holistic grazing system, but he's optimistic. Early this year, he says he tested the soil in around a dozen locations on his farm and the field where he keeps turkeys every year has the highest levels of organic matter in the soil. "It has almost 7 percent organic matter," he explains, "which is crazy because most of the fields around here are much lower; this was a conventional farm before we took over five years ago."

The farmer isn't sure what role the turkeys have played in improving the soil so quickly, but he has a guess. "It could be just that they spread a nice layer of manure around each paddock," he said. "They don't concentrate it like the laying hens but seem to wander around the whole area." This fall, he began placing turkeys on some of the other fields to see if he gets the same results.

Andrew Gunther, executive director of A Greener World, the umbrella organization behind the Animal Welfare Approved (AWA) label, says he's always had questions about poultry in the context of regenerative agriculture.

"Chickens and turkeys eat what we eat," says Gunther. "They need methionine, lysine, and high levels of protein. Humans are more efficient at turning that into energy than chickens. So, why do we pass those nutrients through a chicken?" Ruminants, on the other hand, he adds, "take

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cellulose that we can't digest and turn it into digestible protein—and in the process, they also encourage grass growth and they put nutrients on the ground.”

A Greener World is getting ready to launch a new regenerative agriculture label that Gunther says will encompass “a social justice component and an animal welfare component based on AWA,” in addition to looking at how farmers regenerate their soil and cycle nutrients. And unlike the new, high-profile Regenerative Organic Certification (ROC), it won't require producers to obtain organic certification.

Gunther sees the possibility for turkey production to be certified regenerative, but he doesn't anticipate that many producers will fit the bill.

“If you have a system that has more nutrients [i.e., animal waste], you can partner with a neighbor that grows grains, then you're in a space where perhaps turkey could be considered to be regenerative,” he says. “Or, you know, you could produce enough feed for your turkeys on your own farm and you use the nutrients the turkeys produce to fertilize the grains.” But that type of effort is few and far between.

The Main Street Project in Northfield, Minnesota, appears to be doing the most out-of-the-box regenerative poultry farming, using a silvopasture model that relies on carbon-sequestering perennial trees and shrubs that also provide shelter from predators. But so far, the project—which provides training and business incubation for Latinx and East African immigrants in the area—hasn't branched out to include turkeys.

“Our model is based on what seems to be a return to the natural habitat for the chicken. Evolution-wise, they began in the jungle environment, so they grew up within a canopy,” says Bob Kell, who is the Main Street Project's director of training. The perennial plants also absorb the nitrates from the bird's waste and prevent runoff.

Kell isn't sure about how their work would transfer to turkeys, but adds that it's entirely possible. “Wild turkeys can also live in the woods, so there may be something that could transfer there,” he said.

And yet, while the Main Street Project uses the term regenerative to describe its work, it sells a limited number of chickens through local CSA subscriptions, and so hasn't put that language on the label.

Joyce Farms, an operation based in Winston-Salem, North Carolina, works with a handful of small pasture-based farms around the Southeast, is selling a turkey with the word regenerative. The farm gained permission

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from the Department of Agriculture (USDA)'s Food Safety and Inspection Service (FSIS) to add regenerative to the label after providing written documentation according to the agency's latest guidelines.

Stuart Joyce, the company's vice president of operations, says the farm is also looking for a third-party certification program that is rigorous enough not to allow for a watering-down of the concept.

“We don't want to see it go the way of ‘sustainable,’” adds Joyce. “Because what does that really mean these days?”

He says that while the birds aren't a huge part of what makes the systems on their farms regenerative, they do play an important role in helping conventional farmers transition to a set of practices that includes planting a range of cover crops, cutting out tillage and chemical inputs, and building organic matter in the soil.

“We plant a variety of winter peas, oats, clover, rye grass [on the pasture] and a bunch of other stuff that works really well to cover the bare soil, and it holds up to the turkeys walking outside, stomping on it,” says Joyce. The farm also builds in a rest period between flocks, which allows the pasture—and the soil—a break.

Joyce Farms raised more than 4,000 turkeys this year, and they have sold out of their Thanksgiving birds. “Turkey sales significantly increased this year,” Joyce says.

All Grass Farms, which raised over 500 for the holiday, also sold out this year, and had to stop marketing the turkeys early on because the demand was so high.

Despite this recent interest in turkeys raised by small, niche operations due to the pandemic, Jason Diestel, vice president of operations at Diestel Family Ranch, says it's a different story when you're selling them on a larger scale. The business started raising the birds in 2012, even though they've been able to increase the flock size every year since then.

To Gunther's point about a closed circle, Jason said he has tried to find a corn producer in California to provide feed in exchange for compost from the ranch, but such a relationship has yet to materialize. He says he's working with some producers in the Dakotas who grow their own feed grain.

The biggest hurdle in scaling up their pasture-based and regenerative practices is the cost to producers, and therefore to consumers. And Heidi

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Diestel says the company is committed to producing more affordable options.

The company, which works with Global Animal Partnership (GAP), to certify its animal welfare practices, sells turkeys all along the 5-step GAP scale, meaning they range from Step 1, where the birds are raised cage-free but still raised in indoor, concentrated settings, to step 5, where they live on pasture.

Diestel has been targeted for those lower-welfare practices on the farms from which it buys turkeys in campaigns by the animal rights group Direct Action Everywhere, and it was also recently the target of a class action lawsuit claiming it markets all its products like they come from the home ranch and claiming that the marketing language they use—“thoughtfully raised”—is false advertising. Diestel counter-sued and responded by saying, “All of Diestel’s family of turkeys are labeled according to the GAP ratings and the product’s attributes are stickered on the packaging.”

It’s one thing to produce a few thousand turkeys and sell them directly to consumers, but if you’re trying to reach a wider audience in retail settings such as Whole Foods, cost is the driving factor.

“The demand for high-quality turkeys is just about price point a lot of the time,” said Heidi, who pointed to the fact that many retailers treat cheap holiday turkeys—often priced as low as 99 cents a pound—as loss leaders.

“As long as there’s a low-cost alternative, it makes it much harder to compete,” added Jason. “A lot of producers are stuck in a system, where making the jump [to a system that costs them more to execute] is very difficult.

For that reason, he says he hopes to provide farmers with a bridge to an alternative approach, but it’s not going to happen overnight. “The economics of everything that we do has to shift. And once that happens, then the shifts, the changes of different agricultural production types can happen very rapidly.”

That said, Heidi explained that several of the farms which which they work are prepared to start running pasture-based systems. “We’re inching along. I think it’s going to be in more demand as people get back closer to where their food comes from,” she said.

“If we got to like 5 or 10 percent [of our total production], that would be a pretty big step,” said Jason, who hopes to be able to bring down the cost of their multi-species grazing program over time. “Every year, we’ve

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been learning a little bit more. And having [more pastured birds] could definitely open up some new opportunities in terms of having a more direct impact on soils.”

civileats.com, 23 November 2020

<https://www.civileats.com>

### Does Glyphosate destroy the human gut microbiome?

2020-11-24

More than half the bacteria in the human gut microbiome are sensitive to glyphosate, the mostly commonly used herbicide in the world, reported scientists this month in the Journal of Hazardous Materials.

Researchers from the University of Turku in Finland recently developed a novel bioinformatics tool to predict if beneficial bacteria in the human gut are affected by exposure to glyphosate.

They found that the herbicide could disturb the natural cycles of microbiome life, and potentially harm human health, through weakening the system and causing greater susceptibility to diseases.

“Glyphosate targets an enzyme ... [that] is crucial to synthesizing three essential amino acids,” said Pere Puigbò, who co-developed the bioinformatics tool.

Glyphosate is regularly in the news, viewed as a potential threat to health and well-being because of its widespread use on crops including corn, soy and canola. It is also a household weed killer, particularly the Monsanto/Bayer-owned brand Roundup.

The herbicide is currently banned from many countries including Germany, Saudi Arabia and Vietnam, and is heavily restricted in others. Cities and states across the U.S. are starting to reduce use or pushing for a ban, due to mounting health concerns. Other cities, such as Los Angeles and Miami, have already banned use.

“We need experimental research to study the effects of glyphosate on microbial communities in variable environments,” said researcher Marjo Helander in a statement about the findings.

**“Glyphosate targets an enzyme ... [that] is crucial to synthesizing three essential amino acids,” said Pere Puigbò, who co-developed the bioinformatics tool.**

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“This groundbreaking study provides tools for further studies to determine the actual impact of glyphosate on human and animal gut microbiota and thus to their health.”

ecowatch.com, 24 November 2020

<https://www.ecowatch.com>

### Is belief in God a delusion?

2020-11-24

As the pandemic raged in April, churchgoers in Ohio defied warnings not to congregate. Some argued that their religion conferred them immunity from COVID-19. In one memorable CNN clip, a woman insisted she would not catch the virus because she was “covered in Jesus’ blood”.

Some weeks later, the cognitive psychologist Steven Pinker commented on the dangers of evangelical religious belief in the coronavirus era. Writing on Facebook, he said: “Belief in an afterlife is a malignant delusion, since it devalues actual lives and discourages action that would make them longer, safer, and happier.”

Pinker, of course, is not the first to connect – or equate – religion with delusion. The evolutionary biologist Richard Dawkins is probably the most famous contemporary proponent of this view, which has intellectual roots dating back at least to political theorist Karl Marx and psychoanalyst Sigmund Freud. In his book *The God Delusion*, Dawkins argued that religious faith is “persistent false belief held in the face of strong contradictory evidence”, and thus delusional.

Was Dawkins right? Many have critiqued his arguments on philosophical and theological grounds. But the relationship between his thesis and the dominant psychiatric conception of delusion is less often considered:

This definition is from the American Psychiatric Association’s (APA) “Diagnostic and Statistical Manual of Mental Disorders” – often referred to as the “bible” of psychiatry. The definition is well known but controversial, and those who think belief in God is delusional may take issue with the final clause. Dawkins, for his part, approvingly quoted the writer Robert M Pirsig’s observation that “when one person suffers from a delusion, it is called insanity. When many people suffer from a delusion it is called Religion”.

**In his book *The God Delusion*, Dawkins argued that religious faith is “persistent false belief held in the face of strong contradictory evidence”, and thus delusional.**

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So, is the distinction between insanity and religion a mere semantic quibble? In a new paper, we review research that examines relationships – and distinctions – between religion and delusion. Y SOUND

Penis theft and pathology

The APA’s definition of delusion excludes beliefs that are widely accepted. This drives a seemingly arbitrary wedge between isolated cases of obviously pathological belief and cases where beliefs with the same content have cultural support.

Consider the case of an Australian man who believed his penis had been stolen and replaced with someone else’s. The man had cut his penis and poured boiling water on it, and was surprised that these acts were painful. This is a clear case of delusion, as the belief is false, and this kind of belief is virtually unheard of in Australia.

But beliefs in genital theft do have some cultural acceptance in other parts of the world. Indeed, epidemics of such beliefs – so-called “penis panics” – have been documented in various countries. Should a belief cease to be a delusion once widely adopted? That’s what the APA’s definition of delusion seems to imply.

And this focus on shared belief appears to have other surprising implications. For example, while the APA’s definition of delusion may exclude followers of popular religions, the founders of those same religions may not get a pass until they attract a community of followers, at which point the subculture exemption comes into effect.

Culture and clinical judgment

So there are certainly controversial consequences of judging a belief by its popularity. But we argue that the APA’s clause about culture is clinically valuable. After all, a definition of delusion that pathologizes most of the world’s people would be clinically worthless.

Careful attention to cultural judgements can help clinicians distinguish beliefs that require psychiatric treatment from those that do not. Consider a young Bengali woman’s belief that her husband had been possessed by an invisible spiritual creature called a jinn. Beliefs about jinn possession are widespread in some Muslim communities. In this case, the treating psychiatrists (in Australia) were aided by a Muslim Bengali caseworker who advised about cultural factors impacting the patient’s presentation.

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In addition, the APA's emphasis on cultural acceptance is consistent with a growing awareness of the social function of beliefs. Through our beliefs we do not just model the world around us – we mould it to our purposes. Our beliefs mark us out as members of certain social groups, helping us to secure trust and cooperation.

Indeed, steadfast endorsement of some clearly false propositions – such as the claim that the crowd which attended the 2017 presidential inauguration of Donald Trump was the largest in US history – may be equivalent to ritual body piercing or firewalking: a signal of group commitment that is credible to others precisely because it is hard to sustain.

## Community and continuity

In the case of religious beliefs, there is typically a social payoff to these mental contortions – a range of evidence supports the role of religion in social bonding. But the prevailing psychiatric view is that delusions are idiosyncratic, alienating and stigmatising, representing a dysfunction in the ability to negotiate social alliances.

So what distinguishes healthy religious beliefs – and perhaps beliefs in conspiracy theories – from delusions may be partly a matter of whether or not the belief strengthens community bonds. If sustaining a belief impairs your daily functioning and disrupts your social relationships, then your belief is more likely to count as a delusion.

Nevertheless, distinctions between healthy and pathological religious beliefs are unlikely to be sharp. Instead, the emerging picture is of continuity between religious cognition and cognition associated with mental disorders.

Our aim here is neither to demonize, nor to defend, religious belief. While religion is a source of solace and comfort for millions, particular religious beliefs can be “malignant” in Pinker’s sense – devaluing and damaging mortal lives. And, unfortunately, malignant beliefs that are shared by the many are far more dangerous than those shared by the few.

livescience.com, 24 November 2020

<https://www.livescience.com>

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## The new wave of fishless fish is here

2020-11-24

The year 2020 has not been good to many things, but it has been very, very good to the tuna melt. As the world got weird and we sheltered at home, many of us hankered for the familiar, the stable, the uncool. And there was the tuna melt waiting for us, as uncool as ever.

References to the sandwich spiked on Reddit. New recipes (more or less indistinguishable from the old recipes) flowed onto the internet.

I, too, felt the allure. So, during the height of the pandemic, breaking away from the monotony of the keyboard, I made myself a lunch of soaring satisfaction: crispy bread and creamy tuna under a warm security blanket of cheese. What made it especially gratifying, however, was that it was the first tuna melt of my life that involved no fish at all. It was made with a new plant-based faux tuna called Good Catch, and while I can't exactly say it changed my life, it definitely changed my lunch.

I swore off canned tuna last year, after reading *The Outlaw Ocean*, Ian Urbina's wrenching account of human-rights abuses in the global fishing industry. For years, my list of morally acceptable seafoods had been narrowing as I learned about the environmental impacts of industrial fishing. Bluefin tuna, of course, went out the window long ago. Then it was Chilean sea bass, swordfish, and farmed salmon. Cod, gone. Shrimp, toast. But I clung to canned tuna, in part because of the convenience. A highly functional shot of protein, shelf-stable and cheap, it seemed morally defensible as long as it sported the logos certifying that it was dolphin-safe and sustainably fished.

But that changed when I plunged into Urbina's book, the result of more than three years reporting on high-seas crime across 12,000 nautical miles, all five oceans, and 20 smaller seas. He shipped out on roach-infested, barely seaworthy trawlers, chased pirates and poachers, got caught in border wars, and uncovered a grainy cell-phone video of casual assassinations at sea. After all that, Urbina asked, did we really think “that it is possible to fish sustainably, legally, and using workers with contracts, making a livable wage, and still deliver a five-ounce can of skipjack tuna for \$2.50 that ends up on the grocery shelf only days after the fish was pulled from the water thousands of miles away”?

Spoiler alert: it's not. The average can of tuna drags behind it a tangled net of wrecked ecosystems, definned sharks, debt bondage, child labor, human trafficking, physical abuse, and murder. By the time I finished *The*

**The average can of tuna drags behind it a tangled net of wrecked ecosystems, definned sharks, debt bondage, child labor, human trafficking, physical abuse, and murder.**

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Outlaw Ocean, I couldn't open a can of tuna without imagining a trickle of human blood oozing out. And it's not just tuna. Swordfish, snapper, mahi mahi, mackerel, sardines, squid, and anchovies are all tainted by slavery. So are farmed salmon, farmed shrimp, and cat food, which relies on meal made out of small fish caught in fisheries rife with human suffering.

Many fishing boats are crewed by migrants from poor countries who are desperate for work. The boats can spend years at sea, periodically off-loading their catch to refrigerated mother ships and taking on fresh supplies. Oversight is almost nonexistent. Men are forced to work brutal hours in filthy conditions. Beatings are common. So are deaths.

A typical experience is that of Lang Long, a poor Cambodian man Urbina met in Thailand. Long was smuggled to the Thai coast by a trafficker who promised to get him a construction job, but the job never materialized. Instead, Long was sold to a fishing captain for \$530, to cover his trafficking debt. Once on the boat, he didn't see land again for three years.

During that time, Long was beaten regularly, forced to work up to 23 hours a day, and given insufficient food and water. After trying to escape, he was shackled by the neck and chained to the deck whenever his boat approached another ship.

But Long was relatively lucky. He survived, and was returned to land after a Catholic charity paid the boat's captain \$750 for his freedom. Other sea slaves have described sick deckhands being thrown overboard and intransigent ones being locked in the hold, whipped, or beheaded.

All this happens on the untraceable high seas. By the time a tender comes into port, it can carry a vast mix of legally and illegally caught fish. And that's how a can of tuna gets to your grocery shelf for \$2.50.

So I kissed tuna goodbye. Lunch became a little more inconvenient, but then Good Catch showed up in the grocery aisle. Instead of a can, the product came in an upmarket pouch featuring a photo of a plate heaped with extremely tuna-like shards. Fish-Free Tuna, the label advertised. Chunk Albacore Texture. The ingredients list revealed that it was made using a blend of six legumes—soybeans, peas, chickpeas, fava beans, lentils, and navy beans—with some algal oil and seaweed powder mixed in for "Real Seafood Taste." At \$5 for a 3.3-ounce portion, it was pricier than canned tuna, but not exactly a budget buster.

I'd written a lot about the battle for burger supremacy among fauxtein peddlers like Beyond Meat and Impossible Foods, and I knew the pattern

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those trailblazers had to follow: media campaigns to convince people their fake meats weren't bizarre, slow rollouts of product in a handful of hipster restaurants, and then years of struggle to develop the production and distribution needed to reach the mainstream. I'd assumed alternative seafood would follow the same tortuous path. Yet here was Good Catch, already stocked by mainstream supermarkets like Whole Foods and Giant. Perhaps the trail had been blazed. And that made me wonder if the world of seafood was about to get pounded by a wave of fishless fish.

Second spoiler alert: it is. Many of the most popular seafoods now suddenly face direct competition from dozens of startups offering animal-free alternatives. The industry is still tiny, but sales of plant-based foods have surged 29 percent in the past two years, compared with just 4 percent overall for U.S. retail foods, and many expect the category to follow the arc of plant-based milks, which now account for 14 percent of all retail milk sales.

This is happening just as the seafood industry grapples with COVID-19, which has forced changes to its business model—sales of fresh seafood in restaurants cratered, while canned and frozen seafood surged. The seafood aisle of 2021 may look significantly different from the one that took a hit in the first quarter of 2020. And from what I've seen and tasted, a great deal of it may have nothing to do with the sea.

I bought a pouch of Good Catch and a can of solid white albacore for comparison. At home, I opened the pouch and dumped out a jumble of flaky chunks that had the same pallored look as tuna. The chew was quite firm, which impressed me. Springiness is one of the main attractions of meat, and it's hard to replicate using plants.

The albacore, stripped of support, was weirder than I remembered. Did you know tuna is canned in vegetable broth to give it flavor? Drained, it has nothing going on until you add mayonnaise, celery, and salt. Why had I been killing some of the sexiest fish in the sea for this loser lunch meat?

I preferred Good Catch in every way. It didn't taste like much either—think seaweed-scented chicken breast—but the texture was addictive, and I found myself testing the little bouncy fibers between my teeth. I didn't think of it as tuna so much as chew-na, and I used it liberally, sprinkled over caprese salad for extra tooth, tucked under melted cheese on a piece of toast. It made tasty fish burgers and cakes. It even held up beautifully in a pasta al tonno, simmered in garlicky tomato sauce. In other words, it passed the plug-and-play test. So long, Big Tuna.

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When I called Chris Kerr, Good Catch's cofounder and executive chair, he told me I wasn't the only one to recently discover his product. COVID-19 had triggered a run on shelf-stable everything, and he was scrambling to keep stores stocked. His new 42,500-square-foot factory in Heath, Ohio, had come online just in time.

Kerr asked me how his product measured up. I told him it was never going to take over Instagram, but it was good enough. He agreed, and added that this was all it needed to be. "For the love of God," he said, "it's just a fucking tuna melt!"

Kerr, 53, is irreverent and savvy, and he's got the vision thing. A longtime vegan, he worked at the Humane Society for seven years but eventually found the group's traditional tactics frustrating. "We weren't getting very far in terms of moving the needle on animal welfare," he says. "Vegans are still 0.5 percent of the population." He left in 2014 and was recruited to launch New Crop Capital, a venture firm that invests in vegan food startups. New Crop was an early backer of Beyond Meat and now has a stake in more than 40 companies.

Kerr was one of the first to see the need for a Beyond Meat of seafood. Like the founders of Beyond Meat and Impossible Foods, he came to the problem from the perspective of animal welfare. We're so used to the traditions of fishing that we rarely notice that they involve the mass killing of wild animals, usually in painful ways that would never be acceptable with birds or mammals. (Try hooking a deer in the mouth and dragging it kicking and screaming for miles.)

But until the revelations of human-rights abuses in the fishing industry, the biggest knock against fishing was environmental. According to Daniel Pauly, a prominent British Columbia-based marine scientist, almost no fisheries are truly sustainable. "It's so bad," he says. "Sustainable is not a reliable term anymore. So many fisheries have been reduced to a small fraction of what they once were. You can 'sustainably' fish them at that diminished level, but they really need to be rebuilt to support the ecosystem." According to a number of papers published by leading scientists, the agencies that certify fisheries are deeply flawed, and many fish that have the "sustainable" label applied to them are anything but.

Then there's bycatch—other animals unintentionally caught and killed in nets. About 40 percent of the fishing industry's combined haul is bycatch, a total of 63 billion pounds per year. That carnage includes an estimated 650,000 marine mammals, a million seabirds, 8.5 million sea turtles, and ten million sharks. In the Indian Ocean, more than 80 percent of the

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original dolphin population—four million animals—has been killed in tuna nets.

Aquaculture has not been the salvation many had hoped. Farming fish turns out to have the same problems as farming livestock in industrial settings: animal-welfare issues, disease and parasites, antibiotic overuse, and massive pollution.

For all those reasons, Kerr says, he felt a need to help jump-start the plant-based-seafood industry. "But I couldn't find anything solid to invest in. So I just said, Fuck it, I'll start my own."

Now more mainstream investors—having watched Beyond Meat and Impossible Foods take the world by storm—are scrambling to catch up. In January of this year, General Mills joined a group of companies that invested \$32 million in Good Catch. Soon the celebrities rushed in: Lance Bass, Paris Hilton, Woody Harrelson, and Shailene Woodley all invested in the company.

But the biggest development came in March, when Bumble Bee Foods, the international tuna giant, announced a new partnership to distribute Good Catch's fishless tuna in many places where Bumble Bee sells its own. "They approached us!" Kerr told me. "We were prepared to be attacked by that same company."

"That shocked the industry," says Monica Talbert, CEO of Van Cleve Seafood, a Virginia company that has launched a subsidiary, Plant Based Seafood, that sells a line of fish-free products. "The seafood industry sees plant-based as treasonous. They're trying to squelch it. So for a giant, global company like Bumble Bee to take it on was huge." Talbert thinks the writing is on the wall. "Consumers are demanding it. It would behoove the industry to jump on board."

In Bumble Bee's press release announcing the partnership, CEO Jan Tharp explained the thinking. "It is critically important that, as an industry, we continue to find innovative solutions to decouple growth with environmental impact," she explained. "Providing great-tasting alternative ways for consumers to enjoy ocean-inspired foods is a key pillar of our long-term commitment to ocean health."

Translation: Canned tuna is a sinking stone, and we can't get on the plant-based bandwagon fast enough.

If Good Catch is basically the Beyond Meat of seafood, Van Cleve is something possibly more significant: a traditional business eagerly

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transforming itself into a meatless powerhouse. “I love plant-based seafood,” Talbert says, “because it gives us a platform to shine light on the unsavory things going on in the seafood industry, just like plant-based meat did for the livestock industry.”

Van Cleve Seafood started in 2001 as a Virginia crab shack, launched by Shelly Van Cleve and her teenage daughters, Monica and Monica’s sister Allie. The restaurant and shop soon became a celebrated destination, and they expanded. In 2013, the company began selling its signature products in supermarkets and found that its supply needs outstripped local options. When Talbert researched international sources, she was horrified. “The lawlessness,” she says. “The mislabeling. The fish illegally soaked in chemicals. The child labor, slavery, and human trafficking. Just horrendous practices. It was so disheartening.”

Talbert had been transitioning to a plant-based diet, so they decided to do the same with the company—starting, naturally, with crab cakes. “We’ve probably made a million crab cakes in the past 20 years,” Talbert says. “There’s a weave to the texture of a crab cake that’s very specific. We went through more than a hundred versions to get it right.”

Artichoke, hearts of palm, and cabbage play the role of crabmeat in the final product, with rice flour and potato starch used for binding and a hint of Old Bay seasoning for taste. The cake comes as a frozen lump and is easy to prepare: thaw, fry, top with tartar sauce. The crispy outside and cakey inside does everything a crab cake is supposed to do. Was I aware that I was basically eating an artichoke patty? Yes, I was. Was this a problem? Not at all.

If you want to wield your fork for food justice, however, crab is small potatoes. The average American consumes half a pound of it per year, making it only the ninth most popular seafood. The big three are canned tuna (2.1 pounds per person), salmon (2.6 pounds), and the Goliath of seafood, shrimp (4.6 pounds).

If anything can make tuna fishing look scrupulous, it’s shrimp. Wild shrimp are caught using a massively destructive practice called bottom trawling, which John Hocevar, Greenpeace’s longtime oceans campaign director, describes like so: “Bottom trawlers fish with nets that weigh a couple of tons and are big enough to catch two 747s side by side, and they drag those along the bottom of the ocean. It’s insane.” For every haul of shrimp, a large amount of bycatch is brought in and tossed dead over the side.

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Most shrimp is farmed, and that’s even worse. For feed, operations depend on small fish caught by boats using forced labor and relentless tools that rake the ocean clean. “Off Thailand,” Hocevar says, “the boats fish the water with very fine-meshed nets designed to strain out every last living thing. It’s endgame stuff.”

Shrimp is farmed along tropical coasts in shallow ponds made by ripping out mangroves, trees that protect shorelines and provide essential habitat for many marine species. The ponds become cesspools. After a few years, the ground is so contaminated that the site must be abandoned for a new one. “You just devastate one coastline after another,” says fisheries scientist Pauly.

Despite this mayhem, shrimp hasn’t suffered from consumer resistance the way other seafoods have. “Most people are somewhat aware that shrimp has big problems and they shouldn’t be eating it,” Hocevar says. “But they love it and there’s no real alternative, so they’re not willing to give it up.” For those reasons, he says, “a plant-based alternative would be amazing.”

Pauly was even more enthusiastic about the proposition. “The faster the better. If you can produce some gunk that can take the place of those disgusting shrimp operations, that would be wonderful.”

Well, I just happen to have some of that gunk right in front of me. It’s called konjac root, and it’s popular in Japanese and Korean cooking. Because it’s rich in soluble fiber, it can be boiled into a firmly textured gel. “It bounces back,” says Monica Talbert.

The product I’m sampling—Mind Blown Plant-Based Crunchy Coconut Shrimp—comes in the form of plump pink crescents with a coconut coating. (Paprika provides the pink.) I fried them in oil until they turned golden and served them with cocktail sauce.

And let’s be honest, any breaded product—shrimp, chicken nuggets, whatever—asks very little of its core protein. All it really needs to do is bounce back, and the plant-based shrimp aced that test. The outside was crispy, coconutty, and slightly sweet. The inside was snowy white. (If you are attached to the black vein that bisects real shrimp, you’re out of luck.)

This was the one product I tested that elicited amazed table talk, and it made me realize that Hocevar isn’t entirely correct. People think they love shrimp because shrimp is easy. But all it will take is a slightly sweeter, cleaner alternative to make them wonder what they ever saw in those wriggly little bugs.

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Most of the press on animal-free seafood focuses on what's known as cellular aquaculture—fish in a dish, no head, gut, or tail attached. Rumors of its impending awesomeness have been circulating for a few years, goosed by venture capitalists who've sunk tens of millions into the California startups Wild Type (salmon), Finless Foods (bluefin), and BlueNalu (yellowtail and mahi mahi). Before diving into the world of fishless fish, I'd expected these lab-based products to be the standouts. But as is true with lab-grown meat, the hype has gotten well ahead of the science.

The theory seems solid enough. In animals, muscle cells are supplied with a stream of nutrients delivered by the circulatory system. But those cells can be grown in a tank if they're bathed in a broth of the same nutrients, along with hormone-like growth factors that tell them how to develop. This is the idea behind lab-grown meat, and it's been achieved with various species of fish as well.

You can see the appeal. Cellular seafood doesn't have parasites. It isn't contaminated by mercury or microplastics. It isn't tainted by slavery or ecological damage. And it doesn't die a horrible death.

But the industry faces multiple challenges that so far lack solutions. To grow living cells in a vat is incredibly costly and energy intensive. (One life-cycle analysis of cultured meat found that it has an even larger environmental footprint than conventional beef.) And no one has mastered culturing meat at scale. In a 20,000-liter commercial tank, cells can be crushed by the weight of water or killed by the force of the paddles that keep everything circulating. The serum that bathes the cells costs hundreds of dollars per liter, and it takes 50 liters to produce one serving of meat. Microbial contamination is a constant threat. Texture and flavor are works in progress.

But Jennifer Jacquet, a professor of environmental studies at New York University who has studied the fishing industry extensively, thinks progress may come surprisingly fast. "I don't think you can judge a product's market price by its prototypes, especially with an industry in its infancy," she says. "There are many examples, from clocks to computers, that show us how much prices can fall." Sure, a single serving of cellular fish or meat currently costs hundreds of dollars, but not long ago it cost hundreds of thousands.

Jacquet points out that governments can strongly influence the affordability—and success—of beneficial new technologies. "It's a little bit like renewable energy," she says. "Right now, the cellular animal products,

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including seafood, have to compete on a very uneven footing with meat, dairy, and seafood companies that receive enormous government subsidies, which makes it even more difficult to become price competitive." Jacquet believes that if the seafood industry stopped receiving these subsidies, cellular-based seafood would quickly succeed.

None of the California startups were about to let me sample their lab creations. BlueNalu anticipates having its mahi available by late 2021 in a few select restaurants in San Diego, but experts estimate that it will be five to ten years before cellular seafood is commercially viable. And by then it may be too late. Plant-based seafood is already here, and given another decade of R&D, it's going to be very good and very cheap. Sure, there will still be holdouts who want real fish that came from the sea. But who exactly is going to demand fish from a lab?

Not all the plant-based seafoods I tried were as successful as the ones highlighted here. I very much wanted to like Ahimi, an ahi substitute whose production is simplicity itself: a skinned, seeded tomato lightly concentrated in soy sauce, water, sugar, and sesame oil. Unfortunately, that's pretty much what it tastes like. If you squint hard, it looks a bit like a pink slab of ahi, but there's no getting around that what you have on your plinth of rice is limp tomato. (Apparently others felt the same; the company ceased operations this summer.)

I also wanted to try Kuleana—a bluefin replacement made from a blend of algae, pea protein, seawater, iron from fermented koji, and beetroot (for color)—but its founder told me it wasn't ready for sashimi prime time. For now, true sushi analogs are out of reach, and we'll have to stick to the low-hanging fruits de mer: canned tuna, crab cakes, and breaded shrimp.

But check back in a couple of years and I expect you'll find the sushi counter transformed as well. By then I should be ready to complete the leap to plant-based. I'll make exceptions for a couple of seafood standouts—American shellfish and Alaskan salmon, for example, are paragons of sustainability and deliciousness—but I'll leave the rest to the ocean. Unless, of course, the seafood industry can solve its outlaw problem once and for all.

outsideonline.com, 24 November 2020

<https://www.outsideonline.com>

**"We found some of the highest mercury concentrations that have ever been reported in any living thing anywhere, ever," Page-Karjian told Mongabay.**

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### Are industrial chemicals killing rare whales and familiar dolphins?

2020-11-24

Thousands of chemicals from households, farms and factories quietly enter the ocean every day. Some readily absorb onto bits of another common pollutant: plastic. When mistaken for food by small animals like plankton and anchovies, plastic enters the food chain—along with the chemicals it soaked up.

While the amount of toxins eaten by one anchovy is minuscule, most marine mammals are apex predators, eating hundreds of fish, squid or krill each day. Through a process called bioaccumulation, small amounts of ingested toxins concentrate in carnivores over time, compromising their immune systems and bodily functions.

The researchers collected autopsy data from 83 toothed whales and dolphins that washed up in Florida and North Carolina between 2012 and 2018. They examined 46 bottlenose dolphins (*Tursiops truncatus*), 21 pygmy sperm whales (*Kogia breviceps*), and small numbers of animals from nine other species.

The team screened liver and blubber samples for heavy metals like mercury, lead and arsenic. They also checked for Triclosan, an antibiotic used in dozens of household products; Atrazine, an herbicide used on corn and sugarcane fields; and a handful of plasticizing chemicals such as BPA and NPE, found in countless products from food containers to clothing.

“We found some of the highest mercury concentrations that have ever been reported in any living thing anywhere, ever,” Page-Karjian told Mongabay. Two bottlenose dolphins found stranded in Waves, North Carolina, and North Palm Beach, Florida, had more than 1,400 micrograms of mercury per gram of tissue (1,400 parts per million) in their livers. Just 10 parts per million of mercury can cause neurological damage in human fetuses.

Besides toxins in their tissues, every animal had a number of physical maladies including kidney deterioration, thyroid tumors and chronic liver disease. “A lot of these [ailments] can be caused by stranding or shock, but they can also be caused by toxin exposure,” said Page-Karjian.

Veterinarians traditionally record pathological data during autopsies, but they don't usually test for toxins. The authors believe there's value

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in looking at both. Even if the toxins aren't the direct cause of death, explained Page-Karjian, they “could have led to the animal's demise.”

However, it's difficult to prove that the pollutants killed the animals, said Kathleen Colegrove, a clinical professor of zoological pathology at the University of Illinois. “The authors did a great job in really trying not to make that jump,” she told Mongabay.

One species included in the six-year project, the Gervais' beaked whale (*Mesoplodon europaeus*), is so elusive only a few people have ever seen them alive. “[This study] had three species of beaked whales, which is amazing because those animals rarely strand,” said Colegrove, who was not involved in the study.

Many offshore species like the Gervais' beaked whale spend their lives thousands of kilometers from shore, foraging thousands of meters underwater. And yet, evidence shows they contain potentially lethal levels of industrial chemicals, suggesting the hazards of ocean pollution reach farther than we thought.

The study is an effective first step toward broadening our understanding of chemical contamination in offshore species, Colegrove said. She added that the report “will set up future studies to take a finer-tuned look” at how pollution affects some of the ocean's least-studied mammals.

[news.mongabay.com](https://www.news.mongabay.com), 24 November 2020

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

### When rubber hits the road—and washes away

2020-11-24

The storm unleashed one evening in late November 2018. The first splashes of rain wet the streets of Oakland, California, with a smell like damp stone. Then, a crescendo of water pounded roofs, drops glancing off gutters with metallic pings. As the storm water sluiced over sidewalks and streets, it erased the boundary between land and sea, carrying branches, plastic bottles, motor oil, and more into San Francisco Bay.

At 10:30 that night, an industrial slough near the Oakland Coliseum roared to life. The slough wasn't particularly noticeable hidden behind chain-link fences. But the vast surrounding parking lot made it perfect for measuring the stuff scoured from the city streets by rain. All the water falling across five square kilometers of mostly impervious pavement ran through this choke point. Huddled in rain gear on an overpass, a research team from

**Some 7.2 trillion synthetic particles are washing into San Francisco Bay each year, says Rebecca Sutton, a senior scientist at SFEI and the study lead.**

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the San Francisco Estuary Institute (SFEI) was ready for the cascade. As a stream of cars carrying concertgoers rolled out of the coliseum parking lot, the researchers used sampling rods to sip more than 70 liters from the stream of storm water below.

Later, the team discovered a shocking amount of rubbery black fragments in their samples. Over three years, as they tested water at 12 stormwater outlets and sediment at 20 sites around the bay, they found much the same. Some 7.2 trillion synthetic particles are washing into San Francisco Bay each year, says Rebecca Sutton, a senior scientist at SFEI and the study lead. “Almost half those stormwater particles, so a really high percentage, were rubbery particles that we think are mostly coming from tires.”

In California, where most commuters cling to their cars, conversations about the environmental impact of automobiles usually involve what spews from tailpipes. Electric vehicles are sold as the solution for car emissions. But SFEI’s work has expanded the debate about the environmental impacts of cars to include tires shedding particles near the sea.

“Storm water really hasn’t gotten a lot of attention from the scientific community when it comes to emerging contaminants,” Sutton says. But the rubbery fragments she’s turned up suggest millions of reasons that it should. Tire particles in the water may harm aquatic and marine organisms—just as other microplastics do—including through chemical exposure, movement inside an animal’s body, and bioaccumulation of toxins through the food chain.

With over 51 million waste tires created each year in California, waste managers are finding ways to reuse them, even though researchers are only beginning to grapple with their impacts in storm water and recycling. Tire pollution, it turns out, may be farther reaching than anyone imagined.

Tires have one engineering principle that’s unlikely to change: they shed. The friction of rubber on abrasive surfaces is what allows a heavy vehicle to grip roads and stop when needed, sloughing off bits and pieces of the tire. A 2017 scientific literature search of 13 industrialized and industrializing countries found that an average car loses between a quarter kilogram and two kilograms of tire fragments annually. In the car-happy United States, the amount jumps to nearly five kilograms—or about the weight of a cat.

Once, tires were made entirely from natural rubber. Today, they contain a mix of natural rubber and between 20 and 60 percent synthetic rubber,

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made from plastic polymers. The ingredients and proportions tend to be proprietary, but usually tires also include sulfur, used to vulcanize rubber; zinc oxide, to shorten vulcanization; reinforcing fillers like silica and carbon black; and oils that help processing. Steel wires and fabric are added to give tires structure. The finished product isn’t considered toxic, but some individual ingredients are, including heavy metals like cadmium and lead, and high aromatic oils (more commonly known as polycyclic aromatic hydrocarbons or PAHs), which are considered carcinogenic in some jurisdictions. The mix makes tires a difficult-to-recycle “monstrous hybrid”—a term coined by zero-waste writers Bill McDonough and Michael Braungart—leaving local officials struggling to find ways to keep them from clogging landfills.

Because studying tire fragments in storm water is relatively new, the field is riddled with inconsistencies. There’s no set protocol for measuring, collecting, or defining tire particles, and there’s no consensus on what to call them or what they look like. Researchers for the Tire Industry Project, supported by tire manufacturers, wear down individual tires on a road in a lab, suck up the particles shed in the process, and then identify particle shape and size with a scanning electron microscope and with pyrolysis, a heating method that allows the researchers to single out tire ingredients. “The particles that we find [a half-half mix of tire tread and road pavement] are generally very consistent,” says project manager Gavin Whitmore. “They’re cigar-shaped and 100 micrometers, about the thickness of an American dollar bill.”

In comparison, the fragments that the SFEI researchers found were variable in size and shape. Sarah Amick of the US Tire Manufacturers Association suggests that this might mean the fragments come from surfacing roads with coal tar sealant or chip seal. However, coal tar sealant isn’t used in California, and some chip seal contains recycled tires. It makes sense for tire particles found “in the wild” to look different, Sutton says. Exposed to the elements, the fragments may degrade in ways that lab work doesn’t show.

The threat these tire fragments pose globally is just beginning to come into focus. In 2017, the International Union for Conservation of Nature estimated that 28.3 percent of microplastics in the ocean come from tires, landing them in the top seven contributors. But the real number is likely higher. A study published in July suggests that vast quantities of tire fragments find their way into the ocean not just via rivers and waterways, but also through the air. Swept on the wind, they drift far from where they are shed. The study warned that so many tire particles are landing in the

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Arctic that they pose a climate change risk. By turning the snowy tundra a less reflective white, the polluted Arctic ice may absorb more light and melt even faster.

Because tire particles are denser than seawater, the SFEI team found that they tend to sink and accumulate in sediment near shore. Small fish, oysters, and other animals at the bottom of the food chain live in this rich environment. "It's a pretty direct pathway for exposure," Sutton says. Bottom feeders could be consuming fragments in the same unaware way they eat other microplastics. Studies show that fish pass over 90 percent of the microplastics they eat, but toxicity may still taint their tissues and travel up the food chain. Lab work suggests that marine animals affected by plastic pollution can experience respiratory and reproductive issues, cell damage, and even death.

Researchers at the University of Washington Tacoma and their colleagues suspect that tire fragments may be harming coho salmon in streams around Seattle. Autumn rains wash the city's streets clean just as the salmon swim up their home creeks to spawn. Scientists have known for decades that storm water is killing coho, but since it can carry thousands of possible contaminants, it was difficult to figure out which ones were having lethal effects. The researchers relied on volunteers to call the lab when they spotted coho floundering in the stream, gasping for air at the surface before dying. But field observations directed the researchers to specific creeks where they tested the water and discovered high concentrations of chemicals that are present in tires and can leach into water.

"Coho are enormous and brightly colored, so people can readily see them suffering," says Sutton, but salmon's troubles could signal other systemic problems. "A smaller fish could experience the same impacts, but you wouldn't see it (if you were) walking through a rainy creek."

One potential, and potentially problematic, solution for reducing tire shedding involves changing the texture of pavement. California's concrete and asphalt highways act like cheese graters on tires. On a Thursday in February, shortly before the coronavirus lockdown, I join Matthew Souterre and Marissa Padilla to check out an alternative way to surface roads in Escondido, a bedroom community north of San Diego, where the pair work in the city engineering services department.

Souterre looks in his rearview mirror. "Marissa, where do you have us going to next?" he asks.

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Padilla, in the back seat, shuffles some papers. "The Miller-Alexander area," she says.

"The Miller area ..." Souterre repeats absently until his memory jogs. He executes a silent U-turn, passing bungalows painted in neutral desert tones.

Less than a year earlier, Souterre and Padilla used a grant from the state's recycling agency, CalRecycle, to divert 15,198 tires from landfills. The tires were processed into hot asphalt to form rubberized pavement, which reduces traffic noise and tire shedding, and speeds water drainage due to its porosity.

We arrive at a quiet residential street and I climb out to take a closer look at the road surface. It looks like ... pavement. Souterre and Padilla point out its highlights: no weeds sprouting and no alligatoring—where pavement splits into slabs like reptile skin.

Mixing old tires into new roads is an ideal, full-circle solution that California, burdened with diverting tens of millions of junked tires from landfills annually, has embraced. In 2005, the California State Legislature mandated recycling waste tires in state pavement and aimed to rubberize 35 percent of new pavement projects beginning in 2013. It was hoped that would also lessen air pollution: tire wear contributes to airborne particulate matter—up to 30 percent in high-traffic areas—and the dust can inflame human lungs. But Sutton, of the SFEI, worries that paving streets with ground-up car tires may be unloading their heavy metals and chemicals into sensitive aquatic ecosystems.

"To be honest, the concerns we're now having about tires are brand new concerns. I'm not sure those have been part of the strategy as CalRecycle was trying to come up with new uses for tires," Sutton says. "We want to fix the issue. But reuse needs to be wise, or we're just going to create a new problem."

CalRecycle recently funded a study on whether zinc oxide in rubberized pavement was leaching into California waterways, 40 of which occasionally exceed the Clean Water Act's standards for the heavy metal. The study found that rubberized pavement does indeed leach 40 percent more zinc oxide than non-rubberized pavement, but reached the unsatisfying conclusion that other sources of zinc oxide could be at play—including tire fragments—so it's not possible to definitively pin the blame on recycled tires.

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Amid remaining uncertainty, one immediate low-tech alternative is rain gardens built at road runoff zones. Stormwater pools there, seeping into the earth, which filters out harmful particles before they can reach natural waterbodies. The SFEI team is sampling several rain gardens around San Francisco. One early test site shows a promising 90 percent reduction in particles, including tire fragments. Another long-term path might be tackling the source of pollution itself. Lighter cars and lower speed limits, for example, would help reduce shedding. These changes would require the cooperation of car manufacturers, regulators, and consumers. But perhaps there is no better place to start than in California, where the coastline and car culture are intertwined, for better or worse.

At the end of my tour through Escondido, Souterre says he hasn't heard of downsides to rubberized pavement. In his experience, people like it and often request it once they see it in other neighborhoods. Escondido is trying its best to be environmentally friendly, he says, as we drive past new bike lanes and he parks the city's hybrid car at the town hall. If the risks turn out to be too high, he says he would push for a better fix, if he could find one. We shake hands and say goodbye.

A few weeks later, when the pandemic has taken hold and handshakes have become a thing of the past, I wonder if this might be a hopeful lesson. If we can change our behavior so rapidly to avoid getting sick with COVID-19, perhaps that better fix isn't as out of reach as it seems.

[hakaimagazine.com](https://www.hakaimagazine.com), 24 November 2020

<https://www.hakaimagazine.com>

### How New York is trying to build lots of renewables, fast 2020-11-30

President-elect Joe Biden will face myriad hurdles, many of them political, in fulfilling his campaign promise of steering the U.S. toward 100 percent clean electricity by 2035. But setting aside the challenge of getting climate legislation through a potentially divided Congress, the goal implies an additional miracle will occur — the construction of lots and lots of infrastructure, very fast.

Getting permission to build skyscraper-sized wind turbines or football fields worth of solar panels and connect them to the power grid can be an arduous process, involving studies, environmental reviews, and approvals from various agencies, not to mention navigating local laws and community opposition. New York state, which is required under

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an ambitious climate law passed last year to procure 70 percent of its electricity from renewable sources by 2030, is trying to figure out how to speed all of this up without sacrificing environmental protection or trampling over local control. While New York is still early in this process, its experience may offer lessons that the Biden administration, and other state governments, can take cues from in the future.

In April, New York passed legislation intended to accelerate wind and solar development by streamlining the permitting process through a new Office of Renewable Energy Siting. This was its second attempt to do so — in 2011, the state legislature passed the Power New York Act, which was also supposed to simplify the regulatory process for renewable energy.

But even after the 2011 law went into effect, obtaining a permit for a new utility-scale project still took between 5 and 10 years, according to Anne Reynolds, the executive director of the New York Alliance for Clean Energy, a coalition of clean energy businesses and nonprofits. She said the process lacked standardization — every project proceeded as if the state had never permitted a wind or solar facility before. It was overseen by a board made up of people from multiple agencies who were hard to get into the same room and often disagreed with one another. It didn't accommodate quickly-advancing technologies — if, for example, a developer wanted to switch to new, larger wind turbines midway through the process, altering its permit took forever.

"It was terrible, really," Reynolds said. "There were plenty of projects that died because it took too long."

Developers also faced well-organized opposition, particularly from residents of rural, upstate areas who worried about noise pollution and risks to wildlife, or felt solar panels and wind turbines would ruin the scenery and decrease property values. These claims were sometimes accompanied by resentment that projects were being built to satisfy the energy demands of the more populous downstate region and New York City. Some towns passed temporary moratoriums on wind and solar farms. Between 2011 and 2018, only two utility-scale projects were certified by the state approval board out of 42 that began the process (three withdrew their applications).

The New York Association of Towns, which represents town officials, opposed the new legislation because it allows projects to proceed without following certain local laws or ordinances if the state siting office finds those laws to be "unreasonably burdensome" in light of the state's energy targets. Sarah Brancatella, legal director for the association, said

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local governments have not been obstructionists to renewable energy development.

“We’re not clamoring for coal to come back,” said Brancatella. “These are large-scale projects, they are going to have a significant impact on the community where they’re sited, and it’s just about having those who actually live in the area have a meaningful say in the process.” Moving forward, the association would like to see the Office of Renewable Energy Siting articulate a clearer standard for what “unduly burdensome” means so that local legislators understand which kinds of laws would be preempted.

The new Office of Renewable Energy Siting is responsible for developing uniform regulations and standards that all large-scale renewable energy projects will be subject to. In September, it released a draft of those standards, with criteria developers will have to meet for things like noise, species protection, wetland protection, and minimum distances between renewable infrastructure and property lines and roads. Previously, conditions for each of these were decided on a case-by-case basis.

The standards will reduce uncertainty for developers, but Reynolds thinks they’ll also give communities more clarity about what to expect. In the past, she said, residents would ask how loud a proposed wind farm was going to be, and the developer wouldn’t be able to answer, because it was going to be decided later on through the permitting process. “And then it just didn’t go well from there,” she said, “because the community members would be like, ‘They’re not even telling us how loud it will be.’ And then four years would go by and everyone would hate each other, and then you’d get a permit.”

This month, the siting office is hosting a series of public meetings to take feedback on the new standards, and community fears — many of which are based in misinformation — are on full display. At a virtual public hearing for the Buffalo area, one resident worried about eminent domain. But the proposed regulations specifically say that renewable generators will not be entitled to eminent domain. Another attendee posited that building renewable energy upstate would not serve to reduce statewide emissions due to transmission constraints that would prevent it from being utilized for at least 10 years. Reynolds acknowledged there were constraints in the grid, and that there might be a few times a year when all of the power generated by new projects doesn’t get used, but said the claim was exaggerated.

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“That’s not a reason not to build renewables; it’s a reason to invest in the transmission system,” said Reynolds, “which the state of New York is doing on a parallel track pretty aggressively as well.” The New York Public Service Commission, the state agency that regulates utilities, recently adopted new rules to speed up the development of transmission lines, and approved a transmission project to be developed by the New York Power Authority that it says will unlock 950 to 1,050 megawatts of clean energy.

Another question raised in the Office of Renewable Energy Siting’s public meetings was why the state needed to put projects in rural areas when there were plenty of brownfield sites available. (A brownfield is a site that had been previously developed.) New York is prioritizing development of these sites through a new “Build-Ready” program established through the April legislation, but Reynolds said there aren’t enough to meet its target. Many brownfields are in urban centers and aren’t ideal for energy development. “You wouldn’t want to cover half the city of Buffalo with solar panels — you’d want to redevelop it with affordable housing and businesses and hotels,” she said.

To address these misunderstandings, Clarke Gocker of People United for Sustainable Housing (PUSH) Buffalo, a nonprofit organization that develops sustainable, affordable housing and advocates for socially just economic development, said that the state has a role to play in giving communities the tools and information they need to assess renewable energy projects that come to town. He also pointed to the importance of another aspect of New York’s new law, one that requires that state regulators create a community benefits program that will require the owners of major wind and solar farms to provide some benefit to the community hosting its project. In September, the Public Service Commission proposed that utility customers in host communities receive a credit on their bill for the first 10 years a project was in operation, distributed evenly out of a fund based on the size of the project. The proposal leaves open the possibility for communities to negotiate further benefits with developers, like payment into a conservation fund, or improvements to local parks or roads.

Gocker advocated for a wider definition of community benefits that includes jobs and training. As a Rust Belt community, Buffalo has lost a significant amount of economic activity, and PUSH sees renewable energy as an industry that could help build back community wealth. “We don’t want the investment the state’s making to flow exclusively to private developers,” he said. As part of its “Build-Ready” program, the state is already planning to assess the need for workforce development,

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particularly in environmental justice communities, and create job-training programs if needed. PUSH also wants to see the state assess opportunities for community-owned renewable projects.

The public comment period on the proposed regulations and standards is open until Monday, December 7, and they are set to be finalized by April of next year.

[grist.org](https://www.grist.org), 30 November 2020

<https://www.grist.org>

### The 6 winners of the 'Green Nobels' for environmental activism show that change is possible

2020-11-30

Lucie Pinson started her career as an environmental activist in South Africa, where almost 90% of the energy comes from coal-fired power stations. Originally from France, she worked on the ground with the NGO Friends of the Earth, fighting against new coal projects being built in South Africa. But those coal projects were happening because of financing from major banks around the world, including from French financial institutions. Between 2005 and 2014, French banks including BNP Paribas and Credit Agricole supported the coal industry with more than 30 billion euros, making France the fourth biggest funder of coal at that time.

So Pinson focused her attention on the banks in France, pressuring them to divest from coal projects. That work has made her a winner of the 2020 Goldman Environmental Prize, an annual award that recognizes grassroots environmental activists from each of the world's six geographic regions: Africa, Asia, Europe, Islands and Island Nations, North America, and South and Central America.

"Finance is an amazing tool for change," Pinson says, "because behind all projects, you will find a bank and you will find an insurer." In 2013, she launched a media campaign, putting pressure on banks to stop funding coal projects, and protested at bank offices, handing out information to both employees and customers. And then she went directly to the source of those coal decisions: Friends of the Earth purchased shares of the French banks' stocks, as did Pinson herself, so that she could attend shareholder meetings and speak face to face with the people deciding to fund climate disaster.

**"Finance is an amazing tool for change," Pinson says, "because behind all projects, you will find a bank and you will find an insurer."**

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"It's how you bring the reality of the impacts inside the banks," she says. "It's almost like an eruption in their world." She would show what the impact of those coal projects had on the residents, and invite people from different countries fighting coal projects to talk about their lived experiences. People who live near coal plants have a higher risk of respiratory disease, lung cancer, cardiovascular disease, and other health impacts. Coal plants and mines take away land from communities, threaten their food sources, limit their access to water, and pollute the air. Coal-related air pollution alone leads to more than 800,000 premature deaths a year. "When the bank is speaking about profitability, this speaker can speak about his mom or his kid having asthma," she says.

It didn't always go right inside those meetings. Pinson was threatened verbally and insulted "many times, and sometimes very, very violently." But she doesn't blame the shareholders. "I think it's really about being stricken, and they are stricken because they don't understand climate change," she says. "I'm bringing to them a reality they ignore." Pinson kept the pressure on the decision makers, writing letters to bank executives laying out climate expectations for the next year and publicly ranking the banks based on their coal policies and projects.

And the banks and insurers felt that pressure. In 2017, SCOR, the world's fourth largest reinsurance company, announced it would not insure new coal plants and would stop investing in companies if 30% or more of their revenue came from coal. AXA, the third largest insurance company, said it would divest about \$3.5 billion that had been designated to coal power stations, mines, and tar sands. In 2019, Credit Agricole said it would phase out coal from its portfolio, and as of January 2020, BNP Paribas's investment arm will no longer invest in companies that make more than 10% of their revenue from coal. More than 40 banks and insurers have stopped directly supporting new coal projects, but some still finance companies who then finance coal, and Pinson also publicizes that hypocrisy.

There's still a lot of work to be done to stop the use and financing of coal—which Pinson is continuing via Reclaim Finance, which she founded in 2020—but still, these changes give her hope. "The finance industry is set to think about the short term. It's set to think about profitability, and that's it," she says. "When a financial institution is excluding hundreds of companies not because they are risky for them at this current time but because they are the biggest threat for our climate, it means this financial institution is now thinking about impact, not risk. It's thinking about long term and not short term."

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Winning the Goldman Environmental Prize is recognized as one of the most prestigious environmental honors (it's been called the "Green Nobel"). Pinson is honored alongside five others who fought tirelessly for the environment. Nemonte Nenquimo, an indigenous woman of the Waorani tribe in the Ecuadorian Amazon, led a local resistance movement to help communities in the Amazon fight against oil companies who wanted to enter their lands for oil exploration, and she ultimately protected 500,000 acres of Amazonian rain forest from oil extraction after the Ecuador courts ruled that the government violated the Waoranis' rights.

Kristal Ambrose, from the Bahamas, founded the Bahamas Plastic Movement, addressing the issue of single-use plastic pollution on the islands. With an "army" of environmental youth activists, Ambrose helped draft a plastic ban bill, met with the environmental minister, and convinced the Bahamas government to ban single-use plastic bags, plastic cutlery, straws, and Styrofoam cups and containers.

When the Ghanaian government proposed the construction of the country's first coal power plant, in 2013, Chibeze Ezekiel launched a campaign to raise awareness about the harms of coal, worked with youth organizations to inform residents and local leaders about the health and environmental costs, and ultimately pressured Ghana's environmental minister to cancel the project, shutting coal out of the country.

Paul Sein Twa, of the Karen people in Myanmar, worked to preserve the Salween River Basin in Burma from development projects, spearheading the creation of the Salween Peace Park in 2018. At 1.35 million acres, including 27 community forests and three wildlife sanctuaries, the Peace Park is managed by local communities and protects endangered tigers, pangolins, bears, and more wildlife from destructive developments.

And Leydy Pech, a Mayan beekeeper in Mexico, helped lead an effort against Monsanto when the Mexican government granted the company permits to plant genetically modified soybeans in the Yucatan Peninsula. The herbicides used on those crops soon contaminated local honey supplies, threatening food, the environment, and the livelihood of Mayans. A local university study confirmed that the genetically modified soy pollen was present in the honey, and any presence of GM crops bars that honey from being sold in the European Union, a big export market for these Mexican beekeepers. Pech created a coalition called Sin Transgenicos—Without GMOs—made up of beekeepers, NGOs, and environmentalists, filing a lawsuit against the government. Mexico's supreme court ruled that

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the government had to consult indigenous communities before planting such GM soybeans, and that ruling canceled Monsanto's permits and prohibited others.

For all the Goldman Prize winners, their environmental work is far from over. But to them, the prize is recognition that they did achieve some change, that even more change is possible, and that we can be hopeful about our climate future. "We can win this war," Pinson says. Some people may feel defeated in the face of climate catastrophe, or worried that change isn't happening fast enough. And it might not be happening quick enough, she notes, "but maybe that's because most people think that they can't make a difference, and we need to quit with this culture of defeat," she says. "As a prize winner I'm here to say we can make a difference, and we can achieve change."

fastcompany.com, 30 November 2020

<https://www.fastcompany.com>

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