

Bulletin Board

Contents

MAY. 08, 2020

(click on page numbers for links)

REGULATORY UPDATE

ASIA PACIFIC

Japan Updates PACs list	4
APVMA getting on with business in the face of COVID-19	5
APVMA COVID-19 Update—Industry Advice.....	6
National COVID-19 Safe Workplace Principles.....	7

AMERICA

EPA Announces Its Continued Efforts to Provide Critical Information on Safe Disinfectant Use During COVID-19 Crisis.....	9
Household cleaning products, hand soaps and body soaps (COVID-19) ...	10
Sea Grant research addresses the growing crisis of PFAS exposure, finds PFAS in rainwater	12
Proposed Regulation: Carpets and rugs with PFASs.....	14

EUROPE

Russia grants further extension to chemicals notification deadline	15
Plant protection products regulation list of approved active substances updated	16

INTERNATIONAL

Information Letter 1089 IFR 49 th Amendment 0 3 months extended implementation timeline.....	18
---	----

REACH UPDATE

35 Authorisations granted for 4 substances.....	19
Cefic suggests fast-tracking some EU registrations—if needed	21

JANET'S CORNER

C ²	22
----------------------	----

HAZARD ALERT

Sodium Nitrate	23
----------------------	----

CONTACT US

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

1227 Glen Huntly Rd
Glen Huntly
Victoria 3163 Australia

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

Bulletin Board

Contents

MAY. 08, 2020

GOSSIP

Microplastics found for first time in Antarctic ice where krill source food	26
Close-up of Tumours Reveal A New Cancer Biology	27
No Evidence that COVID-19 is Transmitted through Food Packaging, Says FDA	31
Planes vs trans: High-speed rail set for coronavirus dividend.....	32
Trendy, Cheap, And Dirty: Fashion Is A Top Polluter	35
USDA Let Millions Of Pounds Of Food Rot While Food-Bank Demand Soared	41
Antimalarials Widely Used Against COVID-19 heighten risk of cardiac arrest. How Can Doctors Minimize the Danger?	48
Op-Ed: Ever Heard Of Isoxaflutole? That's About To Change.....	52
Covid-19 May Worsen the Antibiotic Resistance Crisis	54
Molecules Identified That Reverse Cellular Aging Process.....	59

CURIOSITIES

Gardening is important, but seed saving is crucial	62
Where Have All The Insects Gone?	66
The Race To Design A Rain Jacket That Won't Kill The Planet	75
How To Protect Your Mental Health In The Time of Coronavirus.....	80
To Get Around Stay-At-Home Orders, Spaniards Have Been Walking Some Unusual 'Pets'	89
Rice Genetically Engineered To Resist Heat Waves Can Produce Up To 20% More Grain.....	90
Archivists Uncover Earliest Evidence Of A Person Being Killed By A Meteorite	91
Praying For Rain	92
Rare 'Killer' Mutations Present At Birth Could Be Taking Years Off Your Life	99
Dingoes Are Both Pest And Icon. Now There's A New Reason To Love Them.....	101

TECHNICAL NOTES

(Note: Open your Web Browser and click on Heading to link to section)	107
CHEMICAL EFFECTS.....	107
ENVIRONMENTAL RESEARCH.....	107

Bulletin Board

Contents

MAY. 08, 2020

PHARMACEUTICAL/TOXICOLOGY	107
OCCUPATIONAL.....	108

Bulletin Board

Regulatory Update

MAY. 08, 2020

ASIA PACIFIC

Japan Updates PACs list

2020-04-30

On 1 April 2020, Japan designated the following substances as Priority Assessment Chemical Substances (PACs) under the Japan Chemical Substances Control Law (CSCL):

1. Hydrogen cyanide
2. Diethyl phthalate
3. 5-Chloro-2-(4-chlorophenoxy)phenol
4. 2,2'-Dichloro-4,4'-methylenedianiline
5. 2,2'-Dichloro-ar,ar'-methylenedianiline
6. Benzenamine, ar,ar'-methylenebis[ar-chloro-
7. Formaldehyde, polymer with 2-chlorobenzenamine
8. Bicyclo[2.2.1]heptane-2,5-dicarbonitrile
9. Bicyclo[2.2.1]heptane-2,6-dicarbonitrile
10. Bicyclo[2.2.1]heptane-2,?-dicarbonitrile
11. Poly[imino(carbonimidoyl)imino(carbonimidoyl)imino]hexane-1,6-diyl] hydrochloride (1:?)

In addition, on 31 March 2020, the designation of the following substances as PACs was cancelled pursuant to Article 11 of the CSCL:

12. Pyridine-triphenylborane(1/1)
13. N,N-Dimethylpropane-1,3-diyl diamine
14. Compound of carbonic acid and N,N-dimethylpropane-1,3-diamine
15. Manganese N,N'-ethylenebis(dithiocarbamate)

This brought the number of PACs to 226.

Yordas Give, 30 April 2020

<https://www.yordasgroup.com/hive/news/article/898>

22 October 2019

This brought the number of PACs to 226.

Bulletin Board

Regulatory Update

MAY. 08, 2020

APVMA getting on with business in the face of COVID-19

2020-04-30

The Australian Pesticides and Veterinary Medicines Authority (APVMA) has continued its high performance in the March quarter 2020, demonstrating further improvements in the timeliness of its regulatory decisions.

Overall, 90 per cent of total applications were finalised within timeframe. This included an increase in pesticide product applications processed within timeframe, with a completion rate of 97 per cent. The number of veterinary medicines applications achieved within timeframe also increased to 87 per cent.

APVMA Chief Executive Officer, Dr Chris Parker, noted the APVMA's continued high performance comes at a time when the agency's ability to deliver timely decisions for the introduction of agricultural and veterinary (agvet) chemicals to the Australian market is imperative.

"I am very pleased the previous structural and business model changes we implemented have positioned the APVMA to deliver agricultural productivity for the safety of people, animals and the environment," said Dr Parker.

Further, and in response to the World Health Organization's declaration of the COVID-19 pandemic, the APVMA has implemented business continuity arrangements enabling the agency to maintain operations and continue to deliver safe and effective products for Australian farmers.

"Despite the interruption of the COVID-19 pandemic, this quarter the APVMA has demonstrated significant improvements in providing stakeholders with timely, science-based agvet chemical regulation.

"Our people have worked tirelessly this past quarter to ensure the rigorous assessment of applications not only meet the highest of scientific quality standards, but are achieved within timeframe, including an increased demand for emergency use approvals in response to fall armyworm."

View the [March 2020 performance statistics](#).

APVMA, 30 April 2020

<https://apvma.gov.au/>

APVMA staff are well placed to work from home—our IT systems allow for it and our staff have significant experience working remotely, and seamlessly.

Bulletin Board

Regulatory Update

MAY. 08, 2020

APVMA COVID-19 Update—Industry Advice

2020-04-24

Following the World Health Organization's 11 March 2020 declaration of the novel coronavirus (COVID-19) pandemic, the Australian Pesticides and Veterinary Medicines Authority (APVMA) has implemented business continuity arrangements to ensure we can continue to deliver efficient, effective, timely, and science-based agvet chemical regulation.

Maintaining agency operations and continuing to serve the Australian community and our stakeholders is our core focus during this period.

We understand that many of you are facing unprecedented circumstances and we are encouraging you to reach out to us to discuss your needs during this period.

In line with Australian Government advice, we have introduced a social distancing policy, which incorporates staff working from home wherever possible.

APVMA staff are well placed to work from home—our IT systems allow for it and our staff have significant experience working remotely, and seamlessly.

All APVMA staff are still contactable via their email and office phone numbers, and services will continue as usual during our standard operating hours from 9 am to 5 pm AEST, Monday to Friday.

General enquiries should continue to be directed to the APVMA Enquiries Team via email or telephone, +61 2 6770 2300.

COVID-19 processes for seeking changes to existing products and actives

Due to COVID-19, the APVMA understands there are changes registrants may need to make to existing products and actives which may require regulatory approval.

These could include changes to manufacturing sites, product formulations, new sources of active constituent, and product labelling and packaging.

The APVMA has various pathways to progress changes including approvals and variations for products and actives and the issuance of permits.

Bulletin Board

Regulatory Update

MAY. 08, 2020

To minimise any disruption to the current supply of existing registered products during this period, the APVMA may be able to provide expedited assessment for changes to registered products and approved actives in some circumstances.

Applicants seeking to make changes should approach the change in the usual manner with relevant supporting data where required.

Applicants are encouraged to first contact the APVMA to discuss the change. Depending on the circumstance, the APVMA will provide guidance including the most appropriate pathway for the lodgement of applications (i.e. registration variation, permits or notifiable variations).

COVID-19 processes for seeking extensions to notices

We understand that because of COVID-19, some applicants may need to seek an extension of time to respond to notices. This includes but is not limited to s159 (requirements), s85 (proposal to refuse) and 70B (re-categorisations) notices.

Applicants seeking an extension should put their request in writing with their proposed timeframe for responding to the notice. All requests should include the application number and be sent to casemanagement@apvma.gov.au

The APVMA has modified its notices to reflect these changes.

Veterinary product site licencing and audits

Advice for veterinary medicine manufacturers and holders in relation to manufacturing quality and licencing, including audits is available on our website.

APVMA, 24 April 2020

<https://apvma.gov.au/node/66451>

National COVID-19 Safe Workplace Principles

2020-04-24

On 24 April 2020, the National Cabinet agreed to the National COVID-19 Safe Workplace Principles.

Recognising that the COVID-19 pandemic is a public health emergency, that all actions in respect of COVID-19 should be founded in expert health advice and that the following principles operate subject to the measures

In accordance with the Principles, nationally-consistent work health and safety guidance on COVID-19 is being developed by Safe Work Australia.

Bulletin Board

Regulatory Update

MAY. 08, 2020

agreed and implemented by Governments through the National Cabinet process.

The ten Principles can [be found here](#).

Work health and safety guidance for COVID-19

In accordance with the Principles, nationally-consistent work health and safety guidance on COVID-19 is being developed by Safe Work Australia.

Here you will find advice on how to [minimise the risk of exposure to COVID-19](#) in your workplace and help limit the spread.

To keep workers safe and limit the spread of COVID-19, every employer should do the following at their workplace:

- allow workers to work from home, where possible
- ensure [physical distancing](#) by keeping a distance of at least 1.5 metres between people
- encourage all workers to frequently [wash their hands](#) for at least 20 seconds with soap and water or by using an alcohol-based hand sanitiser and to practise [good hygiene](#)
- be aware of how to spot [COVID-19 symptoms](#) (fever, cough, sore throat and shortness of breath) and make sure workers do not come to work if they are unwell
- make sure your workplace is regularly [cleaned](#) and disinfected
- have [signs and posters](#) around the workplace to remind workers and others of the risks of COVID-19 and the measures that are necessary to stop its spread.

For more information, see the [COVID-19 resource kit](#).

Safe Work Australia, 24 April 2020

<https://www.safeworkaustralia.gov.au/covid-19-information-workplaces/other-resources/national-covid-19-safe-workplace-principles>

EPA also published an overview of its actions and resources related to disinfection against the novel coronavirus.

Bulletin Board

Regulatory Update

MAY. 08, 2020

AMERICA

EPA Announces Its Continued Efforts to Provide Critical Information on Safe Disinfectant Use During COVID-19 Crisis

2020-04-24

On April 23, 2020, the U.S. Environmental Protection Agency (EPA) announced it is continuing efforts to provide critical information on surface disinfectant products that can be used against SARS-CoV-2, which causes COVID-19. EPA states that it now has nearly 400 products that have qualified to be effective against SARS-CoV-2. EPA also published an overview of its actions and resources related to disinfection against the novel coronavirus.

EPA's Office of Chemical Safety and Pollution Prevention's Assistant Administrator Alexandra Dapolito Dunn stated that "EPA is dedicated to its mission of protecting human health and we want all Americans to have access to effective and approved surface disinfectant products," and emphasized "[w]e also want everyone follow the directions on the product so that we can safely use registered disinfectants and provide critical protection to our families."

EPA in its announcement stressed when using an EPA-registered surface disinfectant, always follow the product's directions and:

- Never apply the product to yourself or others. Do not ingest disinfectant products. This includes never applying any product on **List N** directly to food;
- Never mix products unless specified in the use directions. Certain combinations of chemicals will create highly toxic acids or gases;
- Wash the surface with soap and water before applying disinfectant products if the label mentions pre-cleaning;
- Follow the contact time listed for your product on **List N**. This is the amount of time the surface must remain visibly wet to ensure efficacy against the virus. It can sometimes be several minutes; and
- Wash your hands after using a disinfectant. This will minimize your exposure to the chemicals in the disinfectant and the pathogen you are trying to kill.

Bulletin Board

Regulatory Update

MAY. 08, 2020

Additional information on EPA's disinfectant safety messages is available on EPA's twitter feeds, [@EPA](#) and [@ChemSafety](#). These channels will be updated with new materials throughout the COVID-19 crisis.

EPA states it is also continuing to add additional chemicals to its **list of common inert ingredients**. These actions are intended to help address supply chain issues for EPA-registered disinfectants and other pesticides. It allows manufacturers of already-registered EPA products to change the source of listed inert ingredients.

Bergeson & Campbell, 24 April 2020

<http://pesticideblog.lawbc.com/entry/epa-announces-its-continued-efforts-to-provide-critical-information-on-safe>

Household cleaning products, hand soaps and body soaps (COVID-19)

2020-04-15

What we are doing

The COVID-19 pandemic has created an unprecedented demand for household cleaning products regulated under the Canada Consumer Product Safety Act (CCPSA) and hand soaps and body soaps regulated as cosmetics under the Food and Drugs Act (FDA). As an interim policy due to the COVID-19 pandemic, we're facilitating the access and sale of certain consumer products and cosmetics in Canada where:

- the label may only be in one official language
- the label may be different from what is required for sale in Canada

Household cleaning products covered under the interim policy

Under the interim policy, Health Canada is facilitating access to certain household cleaning products that do not fully meet the following labelling requirements under the CCPSA:

- the label may only be in one official language
- the hazard symbol(s) is missing on the label
- safety and cautionary information on the label do not conform to the wording set out in the relevant regulations

However, the interim policy does not change the enforcement priority for all other regulatory requirements under the applicable Regulations that apply to household cleaners, such as:

To note, hand and body soaps are still subject to the requirements under the FDA, specifically sections 16 to 18.

Bulletin Board

Regulatory Update

MAY. 08, 2020

- packaging requirements (for example, child-resistant and leak-proof)
- other labelling information, such as the need for instructions for safe use

The interim policy covers the following household cleaning products regulated under the CCPSA:

- cleaning and furnishing care products used mainly to clean, bleach or scour surfaces
- products used to polish, protect or improve the appearance of surfaces are excluded
- laundry and dishwashing products used mainly to clean
- fabric softeners or other products are excluded

Hand and body soaps covered under the interim policy

Under the interim policy, Health Canada is facilitating access to hand and body soaps, regulated as cosmetics under the FDA, that do not fully meet the following labelling requirements:

- the label may only be in one official language
- the ingredients listed on the label are not listed exactly as outlined in the regulations

However, the interim policy does not change the enforcement priority for all other regulatory requirements under the applicable Regulations that apply to cosmetics, such as:

- labelling for avoidable hazards
- prohibiting products that contain an ingredient that may cause injury

To note, hand and body soaps are still subject to the requirements under the FDA, specifically sections 16 to 18.

The interim policy covers hand and body soaps, regulated as cosmetics under the FDA, used mainly to clean the skin. It does not cover:

- products that have a Drug Identification Number (DIN) or Natural Product Number (NPN)
- other products where skin cleaning is not the main function

How to import under this interim policy

To import under this interim policy, importers are required to fill out a form and email it prior to import to hc.ccpsa-lcspc.sc@canada.ca.

Importers will also be expected to:

Bulletin Board

Regulatory Update

MAY. 08, 2020

- provide to Health Canada and make available on their website the label text, with required safety information, as per the CCPSA or FDA, as appropriate, in both official languages, and any required hazard symbols
- mock-up labels are not necessary
- distribute any products with bilingual or French-only labels to regions of Canada where the population mainly speaks and understands French

Note: Unless otherwise communicated by Health Canada, this interim policy will no longer be in effect 3 months after all provinces and territories have ended their states of emergency related to COVID-19.

Remember to continue to:

- record and report all side effects and incidents concerning the use of a product to Health Canada
- keep records on the source and the destination of your consumer products

Health Canada, 15 April 2020

<https://www.canada.ca/en/health-canada/services/home-safety/household-chemical-safety/covid19-cleaning-products-hand-body-soaps.html>

Sea Grant research addresses the growing crisis of PFAS exposure, finds PFAS in rainwater

2020-04-28

A Wisconsin Sea Grant-funded project has helped improve the state's capability to test for PFAS (per- and polyfluoroalkyl substances) and led to the discovery of their widespread presence in rainwater across the country.

The project is led by Martin Shafer, senior scientist with the University of Wisconsin-Madison School of Medicine and Public Health and the and Wisconsin State Laboratory of Hygiene (WSLH). Shafer is also a principal researcher with the National Atmospheric Deposition Program (NADP), the nation's longest-running program for monitoring the chemistry of precipitation, which is housed at the WSLH.

Shafer said the presence of PFAS in everything from the food supply, personal care products, lakes and the atmosphere is a "growing crisis." PFAS

Shafer said the presence of PFAS in everything from the food supply, personal care products, lakes and the atmosphere is a "growing crisis."

Bulletin Board

Regulatory Update

MAY. 08, 2020

exposure is linked to human health concerns, including compromised immunity, low birth weight, endocrine disruption and cancer.

“Everyone in the world, including those in northern Canada and remote regions, all have substantial levels of PFAS in their bloodstreams,” Shafer said. “Some people believe PFAS are a significant threat to human health.”

These chemicals get into the environment from point sources like firefighting foam and industrial processes. Shafer said an estimated 4,500 to 5,000 PFAS compounds exist, but federal regulations currently only target two: PFOS and PFOA.

With help from the Sea Grant funding, the WSLH can now measure levels of 36 PFAS compounds, which is the highest available in the state. “Two other labs in Wisconsin can test for PFAS, but they can’t offer the breadth of compounds nor the breadth of matrices that the state lab can,” Shafer said.

Rainwater is another source of PFAS that, until recently, has received limited study. In his researcher role with the federal NADP, Shafer is in an ideal situation to study the cycling of PFAS in the atmosphere and rainwater deposition.

Precipitation samples from 263 sites of the NADP National Trends Network across the country “appear” on his lab doorstep every weekday. Studying samples from 31 of those sites, Shafer found measurable levels of PFAS in almost all, some up to four or five nanograms per liter.

“Considering that Wisconsin just promulgated an action level of two nanograms per liter and a regulatory level of 20 for PFAS, that’s not insignificant,” he said. “We showed that deposition from rainfall events integrated over a year could represent and supply a large fraction of PFAS loading to large lakes, and similarly, to terrestrial environments that are not receiving any other point-source loadings of PFAS.”

Shafer presented his rainfall study results at the American Geophysical Union meeting last fall in San Francisco, which resulted in media interest from outlets like “The Guardian,” and The Weather Channel. The U.S. Environmental Protection Agency also took note and will be using these data in their deposition models.

Shafer is now gearing up to study the role of wastewater treatment facilities in disseminating PFAS. Sea Grant is funding a graduate student to work on this project and the Wisconsin Department of Natural Resources (DNR) is providing funding for analysis at the WSLH. Samples

Bulletin Board

Regulatory Update

MAY. 08, 2020

of wastewater influents, effluents, biosolids and air emissions will be collected and analyzed.

Because the wastewater treatment facilities collect and concentrate wastes from many different sources, Shafer is concerned that they could unwittingly be a point-source for PFAS pollution. Spreading biosolids produced at the treatment plant on agricultural fields could result in further dissemination with potential for contamination of water resources and crops.

With funding and collaboration with the DNR, Shafer will also be studying how PFAS are distributed and transformed in the atmosphere. He will be collecting PFAS precipitation samples from seven NADP sites in Wisconsin for a three-and-a-half-month period, every week.

“That will be one of the more intensive studies of PFAS done anywhere,” Shafer said. He’s also working with several northeastern states to establish a similar project.

“We need to understand what is driving the distribution pattern of PFAS in the atmosphere — what compounds are contributing to the load, how can we fingerprint sources – a whole list of things where further work would need to be done,” Shafer said.

Sea Grant, 28 April 2020

<https://www.seagrants.wisc.edu/news/sea-grant-research-addresses-the-growing-crisis-of-pfas-exposure-finds-pfas-in-rainwater/>

Proposed Regulation: Carpets and rugs with PFASs

2020-04-30

Announcement: Extension of 45-Day Comment Period and Postponement of Hearing

On February 28, 2020, notice was given that the Department of Toxic Substances Control (DTSC) proposes to adopt regulations listing Carpets and Rugs Containing Perfluoroalkyl or Polyfluoroalkyl Substances as a Priority Product. On March 4, 2020, Governor Newsom proclaimed a State of Emergency in California, as a result of the threat of COVID-19. On March 20, 2020, Governor Newsom issued a “shelter-at-home” order to preserve public health and safety. Due to the threat of COVID-19, the public hearing originally scheduled for April 13, 2020, shall be postponed to May 15, 2020, and conducted remotely using a teleconference line. The public

On March 4, 2020, Governor Newsom proclaimed a State of Emergency in California, as a result of the threat of COVID-19.

Bulletin Board

Regulatory Update

MAY. 08, 2020

comment period shall also be extended until the date of the virtual public hearing.

For details on the hearing and to see the extension notice that was mailed out on April 30, 2020, [click here](#).

DTSC, 30 April 2020

<https://dtsc.ca.gov/reg/proposed-regulation-pfass-in-carpets-and-rugs/>

EUROPE

Russia grants further extension to chemicals notification deadline

2020-04-28

Companies now have until 1 August to submit data to Russia's national inventory of chemicals. The country's Ministry of Industry and Trade (Minpromtorg) has officially extended the deadline due to the impact of the coronavirus Covid-19 pandemic.

In a letter to industry dated 24 April, Minpromtorg said that the measure was taken to support an industry facing difficulties with remote working and changes to the supply chain.

It is the second time the ministry has pushed back the deadline – earlier this year it was extended from the initial 1 January date to 1 May.

The Eurasian Economic Union (EEU) member states – Armenia, Belarus, Kazakhstan, Kyrgyzstan and Russia – are all expected to create inventories as part of national registers of substances and mixtures. These will feed into the Eurasian technical regulation on the safety of chemical products – also known as TR EAEU 041/2017 and Eurasia-REACH.

The Eurasian Economic Commission, the EEU's executive arm, will eventually merge all data collected from member states into one common inventory for the entire region.

Compilation of inventory data has started before the implementation of secondary legislation under the technical regulation. EEU members are yet to agree on three areas:

- a list of chemicals that are restricted and banned;

The country's Ministry of Industry and Trade (Minpromtorg) has officially extended the deadline due to the impact of the coronavirus Covid-19 pandemic.

Bulletin Board

Regulatory Update

MAY. 08, 2020

- a position on the grounds for refusing state registration of chemicals; and
- rules for completing chemical safety reports.

It is not known when talks will resume, but the technical regulation is expected to enter into force on 2 June next year.

Under the regulation, companies will see a phased-in approach to registration according to the annual tonnage band. It is not clear if the proposed deadlines set by the draft second tier legislation for substances will also be extended. The earliest is for chemicals produced in the >1,000 tonnes per year band on 2 June 2021.

Chemical Watch, 28 April 2020

<https://chemicalwatch.com/111636/russia-grants-further-extension-to-chemicals-notification-deadline#overlay-strip>

Plant protection products regulation list of approved active substances updated

2020-04-29

The approval of the following active substances under the Plant protection products Regulation (EC) No. 1107/2009 has been renewed as per Commission Implementing Regulation (EU) 2020/421 of 18 March 2020:

16. Abamectin
17. Bacillus subtilis (Cohn 1872) strain QST 713
18. Bacillus thuringiensis subsp. aizawai strain ABTS-1857 and strain GC-91
19. Bacillus thuringiensis subsp. israeliensis (serotype H-14) strain AM65-52
20. Bacillus thuringiensis subsp. kurstaki strain ABTS 351, strain PB 54, strain SA 11, strain SA 12, strain EG 2348
21. Beauveria bassiana strain ATCC 74040, strain GHA
22. Clodinafop
23. Clopyralid
24. Cydia pomonella Granulovirus (CpGV)
25. Cyprodinil
26. Dichlorprop-P
27. Fenpyroximate
28. Fosetyl
29. Lecanicillium muscarium (formerly Verticillium lecanii) strain Ve 6

The approval of the following active substances under the Plant protection products Regulation (EC) No.

Bulletin Board

Regulatory Update

MAY. 08, 2020

30. Mepanipyrim
31. *Metarhizium anisopliae* var. *anisopliae* (formerly *Metarhizium anisopliae*) strain BIPESCO 5/F52
32. Metconazole
33. Metrafenone
34. *Phlebiopsis gigantea* strain VRA 1835, strain VRA 1984, strain FOC PG 410.3
35. Pirimicarb
36. *Pseudomonas chlororaphis* strain MA 342
37. Pyrimethanil
38. *Pythium oligandrum* strain M1
39. Rimsulfuron
40. Spinosad
41. *Streptomyces* K61 (formerly *S. griseoviridis*) strain K61
42. *Trichoderma asperellum* (formerly *T. harzianum*) strain ICC012, strain T25, strain TV1
43. *Trichoderma atroviride* (formerly *T. harzianum*) strains IMI206040 and T11
44. *Trichoderma gamsii* (formerly *T. viride*) strain ICC080
45. *Trichoderma harzianum* Rifai strain T-22, strain ITEM 908
46. Triclopyr
47. Trinexapac
48. Triticonazole
49. Ziram

As a result, these substances have now been updated in the list of approved active substances (the Annex to Commission Implementing Regulation (EU) No. 540/2011).

Yordas Hive, 29 April 2020

<https://www.yordasgroup.com/hive/news/article/895>

We hope that this additional time will help our members and stakeholders to manage the implementation of what we consider a milestone achievement in the history of the IFRA Standards in these critical times.

Bulletin Board

Regulatory Update

MAY. 08, 2020

INTERNATIONAL

Information Letter 1089 IFR 49th Amendment 0 3 months extended implementation timeline

2020-04-02

Dear Colleagues,

Since the notification of the long awaited 49th Amendment with the effective date of January 10, 2020, the current business environment has changed dramatically due to the global pandemic of the SARS-CoV-2 virus and the resulting COVID-19 disease. We have received reports about significant impacts on the fragrance industry and on the sustainability of our supply chains, alongside with messages and requests from fragrance houses, consumer good companies as well as two member associations to consider extending the compliance timelines for the IFRA 49th Amendment. Given that this is an unprecedented situation, this topic was brought to the attention of the IFRA Board where it was discussed on March 30, 2020. After careful consideration of the pros and cons of revising the already communicated timelines, the IFRA Board unanimously agreed to grant an additional three months for the implementation of the 49th Amendment as detailed in the time chart next page. We hope that this additional time will help our members and stakeholders to manage the implementation of what we consider a milestone achievement in the history of the IFRA Standards in these critical times. If you have any further questions, please contact Matthias Vey (mvey@ifraorg.org) at IFRA.

Best regards, IFRA

IFRA, 2 April 2020

<https://ifragrance.org/safe-use/standards-guidance>

Bulletin Board

REACH Update

MAY. 08, 2020

35 Authorisations granted for 4 substances

2020-04-29

On 15-16 April 2020, the European Commission granted 35 Authorisations for the following substances:

1. Dichromium tris(chromate)
2. Potassium hydroxyoctaoxo-dizincate dichromate
3. Strontium chromate
4. Chromium trioxide

The Authorisations are held by 13 companies and concern 7 Authorised uses:

5. Authorisation numbers REACH/20/1/0 and REACH/20/1/1 are held by Henkel AG & Co. KGaA and Henkel Global Supply Chain B.V. respectively, and approve the use of Dichromium tris(chromate) in formulation of mixtures intended exclusively for uses REACH/20/1/2 and REACH/20/1/3.
6. Authorisation numbers REACH/20/1/2 and REACH/20/1/3 are held by Henkel AG & Co. KGaA and Henkel Global Supply Chain B.V. respectively, and approve the use of Dichromium tris(chromate) in surface treatment of metals (such as aluminium, steel, zinc, magnesium, titanium, alloys), composites and sealings of anodic films for the aerospace sector in surface treatment processes in which any of the key functionalities listed in the Annex is required.
7. Authorisation numbers REACH/20/6/0, REACH/20/6/1, REACH/20/6/2, REACH/20/6/3, and REACH/20/6/4 are held by PPG Industries (UK) Ltd., Finalin GmbH, PPG Europe B.V., PPG Coatings SA, and Aviall Services Inc. respectively, and approve the use of Potassium hydroxyoctaoxo-dizincate dichromate in formulation of mixtures intended exclusively for uses REACH/20/6/5 to REACH/20/6/9.
8. Authorisation numbers REACH/20/6/5, REACH/20/6/6, REACH/20/6/7, REACH/20/6/8, and REACH/20/6/9 are held by PPG Industries (UK) Ltd., Finalin GmbH, PPG Europe B.V., PPG Coatings SA, and Aviall Services Inc. respectively, and approve the use of Potassium hydroxyoctaoxo-dizincate dichromate in primer and coatings (including as wash primers) for the aerospace sector in which any of the following key functionalities is required: corrosion resistance, adhesion of paint / compatibility with binder system, layer thickness, chemical resistance, temperature resistance (thermal shock resistance), compatibility with substrate and processing temperatures.

On 15-16 April 2020, the European Commission granted 35 Authorisations for the following substances:

•

Bulletin Board

REACH Update

MAY. 08, 2020

9. Authorisation numbers REACH/20/7/0, REACH/20/7/1, REACH/20/7/2, REACH/20/7/3, REACH/20/7/4, REACH/20/7/5, REACH/20/7/6, REACH/20/7/7, REACH/20/7/8, and REACH/20/7/9 are held by Akzo Nobel Car Refinishes B.V., Habich GmbH, Henkel Global Supply Chain B.V., Indestructible Paint Ltd., Finalin GmbH, Mapaero, PPG Europe B.V., PPG Industries (UK) Ltd., PPG Coatings SA, and Aviall Services Inc. respectively, and approve the use of Strontium chromate in formulation of mixtures intended exclusively for uses REACH/20/7/10 to REACH/20/7/19.
10. Authorisation numbers REACH/20/7/10, REACH/20/7/11, REACH/20/7/12, REACH/20/7/13, REACH/20/7/14, REACH/20/7/15, REACH/20/7/16, REACH/20/7/17, REACH/20/7/18, and REACH/20/7/19 are held by Akzo Nobel Car Refinishes B.V., Habich GmbH, Henkel Global Supply Chain B.V., Indestructible Paint Ltd., Finalin GmbH, Mapaero, PPG Europe B.V., PPG Industries (UK) Ltd., PPG Coatings SA, and Aviall Services Inc. respectively, and approve the use of Strontium chromate in application of primers and specialty coatings in the construction of aerospace and aeronautical parts, including aeroplanes/helicopters, spacecraft, satellites, launchers, engines, and for the maintenance of such constructions for the aerospace sector in which any of the following key functionalities is required: corrosion resistance, adhesion of paint/ compatibility with binder system, layer thickness, chemical resistance, temperature resistance (thermal shock resistance), compatibility with substrate or processing temperature.
11. Authorisation number REACH/20/8/0 is held by HAPOC GmbH & Co KG, and approves the use of Chromium trioxide in solid form and in aqueous solution of any composition to modify the properties of surfaces made of brass or bronze for medical engineering products, exclusively for the final preparation of such surfaces and the transparent plating of an interior housing part of an anaesthesia evaporator for further incorporation into anaesthetic machines for hospitals and clinics.

Yordas Hive, 29 April 2020

<https://www.yordasgroup.com/hive/news/article/897>

Cefic has suggested the idea of fast-tracking certain types of EU registrations of chemicals to meet urgent demand during the Covid-19 coronavirus crisis.

Bulletin Board

REACH Update

MAY. 08, 2020

Cefic suggests fast-tracking some EU registrations—if needed

2020-04-30

Cefic has suggested the idea of fast-tracking certain types of EU registrations of chemicals to meet urgent demand during the Covid-19 coronavirus crisis.

In an interview with Chemical Watch, Cefic product stewardship executive director Sylvie Lemoine praised the European Commission and Echa for engaging “swiftly and constructively” with business groups to tackle supply chain and regulatory bottlenecks.

Echa has already pushed back deadlines for some activities, such as the start of its completeness checks of the chemical safety reports that form part of some REACH registrations, and Cefic has welcomed such actions.

The idea of fast-tracking, Dr Lemoine said, would be for substances used as ingredients for urgently needed pharmaceuticals; new ingredients that were previously produced elsewhere but now need to be produced in Europe for the first time; or for substances produced by companies that are newcomers to the market.

Another category of registration that deserves a faster process during the Covid-19 crisis, says Dr Lemoine, covers those that become necessary because a merger or acquisition changes the legal entities that produce the substance.

She adds that Cefic is “not calling for a permanent change or anything new – just a need to be conscious of the needs of critical supply chains”.

Cefic is ‘not calling for a permanent change or anything new – just a need to be conscious of the needs of critical supply chains’

Cefic’s number one priority, says Dr Lemoine, is to identify and remove all the bottlenecks – whether related to transport and supply chains or to regulatory compliance. For product stewards and compliance managers the situation is “business as usual – with more stress”.

Full Article

Chemical watch, 30 April

<https://chemicalwatch.com/112632/cefic-suggests-fast-tracking-some-eu-registrations-if-needed>

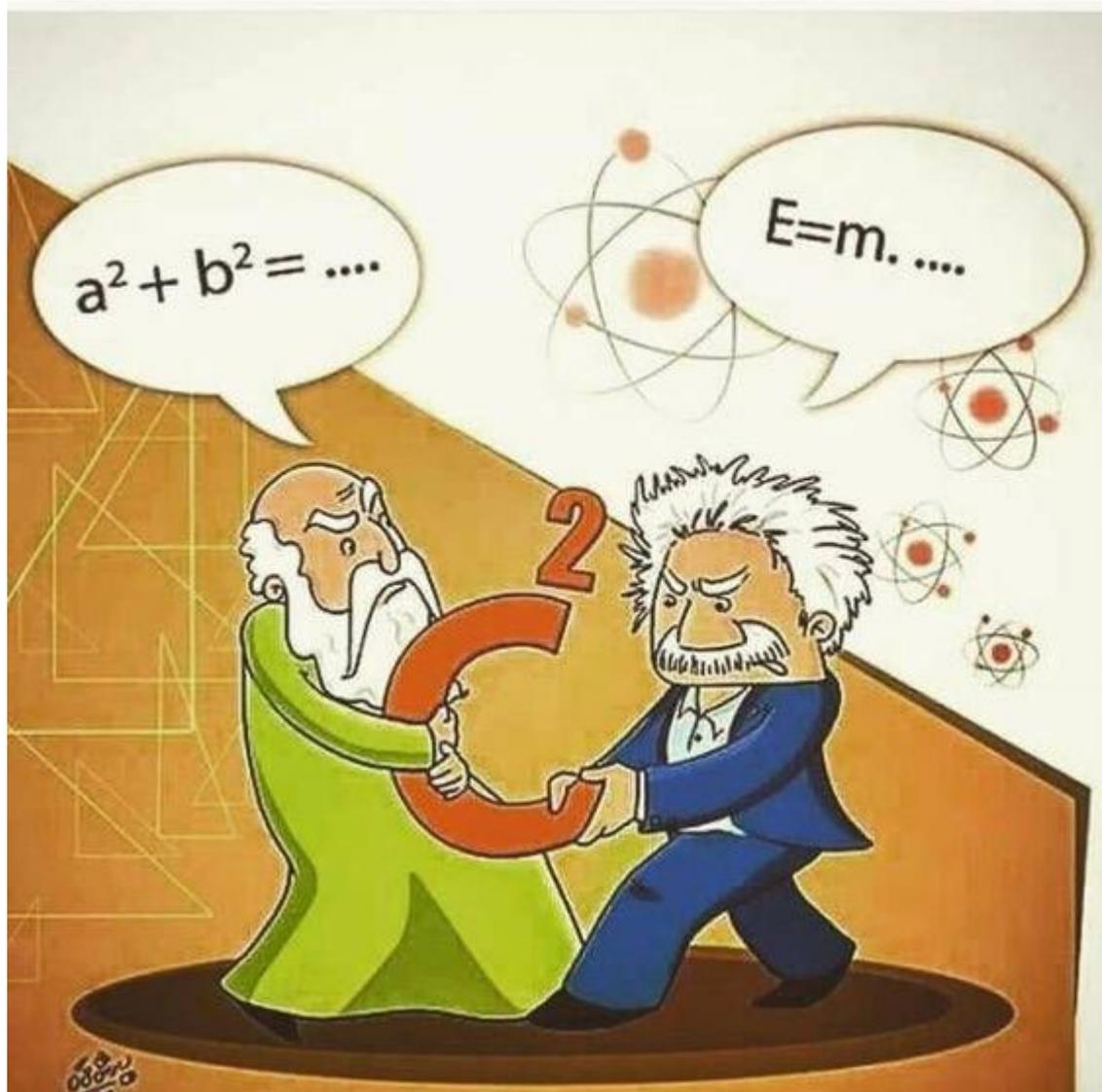
Bulletin Board

Janet's Corner

MAY. 08, 2020

c²

2020-05-08



<https://i.pinimg.com/736x/2e/1b/e1/2e1be1e1c22c9963308c92607c2a4da7.jpg>

Bulletin Board

Hazard Alert

MAY. 08, 2020

Sodium Nitrate

2020-05-08

Sodium nitrate—also known as Chile saltpeter—is an organic nitrate salt. It is a naturally occurring mineral and its chemical symbol is NaNO_3 . At room temperature, the compound exists as a white crystalline solid. Sodium nitrate is highly soluble in water and ammonia and is non-flammable. The compound is a strong oxidising agent. When heated to temperatures above 538°C , the compound explosively decomposes. In the 19th century, sodium nitrate was known as “white gold”. It has been categorised as the International Cancer Research Agency as likely to cause cancer to humans. [1]

USES [1]

Sodium nitrate is used in a number of different ways, including in the food, energy and gardening sectors. In the food industry, the compound is most commonly used as a preservative and as a way to add colour (usually red or purple) to processed meats. The compound is also used as an ingredient in several fertilisers; it also acts as an oxidiser in fireworks. Sodium nitrate can also be found in some instant ice packs. It is used in the transfer and storage of heat in solar panel plants and can be used as a substitute “ingredient” in gunpowder.

ROUTES OF EXPOSURE [3]

- Sodium nitrate is naturally found in fruits, vegetables and grains, including carrots, celery and spinach.
- High doses of sodium nitrate are usually found in crop fertilisers.
- Another route of high exposure is drinking water (both from a well and other sources), if nitrate compounds enter it.

HEALTH EFFECTS

Sodium nitrate poisoning affects a range of systems including the blood, cardiovascular and integumentary systems.

Acute Effects [3]

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

- If there are high concentrations of sodium nitrate in fruits and vegetables, the first signs will show after four hours.

Sodium nitrate—also known as Chile saltpeter—is an organic nitrate salt.

Bulletin Board

Hazard Alert

MAY. 08, 2020

- If sodium nitrate is ingested, the symptoms will first show after an hour.
- A characteristic sign of (sodium) nitrate poisoning is brown-tinged blood in stool.
- Sodium nitrate exposure can also cause blue mucous membranes, nail beds and lips; nausea, vomiting, stomach cramps; yellowing of the white part of the eye and liver pain.

Chronic Effects [3]

Sodium nitrate is toxic to multiple body systems. Long-term exposure to the compound will cause a prolonged state of hypoxia. This will result in a disturbance to all tissues across the body. In children, hypoxia as a result of sodium nitrate poisoning results in delayed mental and physical development, impaired heart and blood vessel functioning, a decrease in the effectiveness of the immune system, and an increased irritability.

SAFETY

First Aid Measures [4]

- **Ingestion:** If sodium nitrate is ingested, rinse mouth and DO NOT induce vomiting. Immediately call a doctor or a poison centre.
- **Skin contact:** In case of skin or hair contact, remove/take off all contaminated clothing and immediately rinse exposed skin with mild soap and water. Do not re-wear clothing until it has been decontaminated. Call a poison centre.
- **Eye contact:** Rinse eyes carefully with water for several minutes. Check for and remove contact lenses if easy to do so. Continue rinsing. Only obtain medical attention if symptoms persist.
- **Inhaled:** Take victim to the nearest fresh air source and monitor their breathing. Allow them to rest and contact a medical professional.
- **General:** Never administer anything by mouth to an unconscious, exposed person.

Exposure Controls/Personal Protection [4]

- **Engineering controls:** Emergency eyewash fountains and safety showers should be accessible in the immediate area of the potential

Bulletin Board

Hazard Alert

MAY. 08, 2020

exposure. Ensure there is adequate ventilation. Whenever possible, material should be handled in a laboratory.

· Personal protection: Safety glasses, protective and dustproof clothing, glove, an apron and an appropriate mask.

REGULATION [5]

United States:

The Occupational Safety and Health Administration (OSHA) has set an 8-hour time weighted average (TWA) concentration for sodium nitrate of $15\text{mg}/\text{m}^3$.

Australia [6]

There is no specific TWA set for sodium nitrate. However, Safe Work Australia has set an 8-hour time TWA for dust limits of $10\text{mg}/\text{m}^3$. It should be highlighted that the TWA values are likely to be higher than the biological standards exposure level for the compound; therefore, all reasonable steps must be taken to minimise the level of exposure to a level well below the workplace standard.

REFERENCES

1. <https://byjus.com/chemistry/sodium-nitrate-nano3/>
2. <https://www.thespruceeats.com/sodium-nitrate-and-sodium-nitrite-facts-996129>
3. http://en.intoxication-stop.com/otravlenie-nitratami_html_default.htm
4. <http://www.labchem.com/tools/msds/msds/LC24650.pdf>
5. <https://www.jostchemical.com/documentation/SDS/Sodium%20Nitrate%20%287631-99-4%29.pdf>
6. <https://www.chemsupply.com.au/documents/TA0101CH9T.pdf>

Bulletin Board

Gossip

MAY. 08, 2020

Microplastics found for first time in Antarctic ice where krill source food

2020-04-22

Small pieces of plastic have been detected in sea ice in [Antarctica](#) for what scientists believe is the first time.

Microplastics have previously been discovered in Antarctica's surface waters, sediment and in snow, but the new discovery could mean the region's krill – which feed on algae from sea ice – may be more exposed to the plastic.

Some 96 pieces of plastic less than 5mm wide were found in an analysis of the ice core that was drilled in 2009 and had been stored in Hobart, Tasmania.

The study found 14 different kinds of plastic, and on average about 12 pieces of plastic were found per litre of water.

Anna Kelly from the Institute for Marine and Antarctic Studies at the University of Tasmania, was the lead author of the study, published in the [Marine Pollution Bulletin](#).

Kelly said: "The remoteness of the Southern Ocean has not been enough to protect it from plastic pollution, which is now pervasive across the world's oceans."

She said the concentrations found in the Antarctic ice core were slightly lower than a [previous study that found microplastics in Arctic sea ice](#).

She said: "The microplastic polymers in our ice core were larger than those in the Arctic, which may indicate local pollution sources because the plastic has less time to break down into smaller fibres than if transported long distances on ocean currents.

"Local sources could include clothing and equipment used by tourists and researchers, while the fact that we also identified fibres of varnish and plastics commonly used in the fishing industry suggests a maritime source."

Assoc Prof Delphine Lannuzel, also of IMAS and a co-author of the study, is a sea ice chemist who helped drill the core about two kilometres from the coast in 2009.

The study found 14 different kinds of plastic, and on average about 12 pieces of plastic were found per litre of water.

Bulletin Board

Gossip

MAY. 08, 2020

The core was taken from “fast ice” – ice that forms around the coast and is not mobile, unlike pack ice. The core analysed was about 1.1m long and about 14cm wide.

Lannuzel said when researchers analysed the core, they found the plastics were surrounded by algae that had grown in the ice.

“Sea ice is habitat for key foraging species,” she said. “Krill defines everything else in the food chain and it relies on sea ice algae to grow.

“When you think now that sea ice algae is associated to plastics, you can think about the bioaccumulation of the plastics in krill and in whales.”

There was a higher concentration of plastic particles at the bottom of the ice core.

She said a lot of study was still needed to understand the impact of plastics on species relying on the sea ice.

She said it was not known if the toxicity of plastics was affected by the processes in the guts of krill and other species, including whales that feed on the krill.

Kelly said: “Rather than sinking to the deep ocean, the entrapment of microplastics in Antarctic sea ice allows them to persist for longer near the sea surface.

Kelly said krill was “a keystone species in Southern Ocean ecosystems” and was vital for marine predators higher up the food chain.

“It is worth noting that plastic contamination of West Antarctic sea ice may be even greater than in our ice core from the east, as the Antarctic peninsula hosts the bulk of the continent’s tourism, research stations and marine traffic.”

[theguardian.com](https://www.theguardian.com), 22 April 2020

<https://www.theguardian.com>

Close-up of Tumours Reveal A New Cancer Biology

2020-04-21

When Brad Bernstein first looked at cancer tumors cell by cell in 2014, what he found dismayed him: he realized that in any single tumor, there is not one type of cancer cell at work but many. “I was a little depressed when I saw it,” says Bernstein, a pathologist at the Broad Institute of the

It is now possible to separate and identify the sequence of nearly every RNA in a given cell so rapidly that thousands of cells can be analyzed at once in a tissue sample.

Bulletin Board

Gossip

MAY. 08, 2020

Massachusetts Institute of Technology and Harvard University. “Some of the toughest tumors out there are really heterogeneous mixtures [of cells].”

But for many clinicians and surgeons working to treat cancer, this observation about the nature of tumor cells was a glass more half-full than half-empty. They already knew that treating some tumors is an incredibly difficult problem, Bernstein says, “and now you’ve shed light on *why* it’s an incredibly difficult problem.”

In order to zoom in and look at a tumor one cell at a time, Bernstein and his colleagues use a technique called single-cell RNA sequencing (scRNA seq). It shows, in principle, what each individual cell in a sample is doing and which genes within that cell are active. This technology is revealing a whole new dimension to cancerous tumors—that they are mosaics of different cell types, more like loosely structured organs than an undisciplined mass of replicating cells, as was previously thought. And these tumor cells can change their developmental path in a fluid manner, presenting unique challenges—and opportunities—for treatment.

Six years after Bernstein and his team got that initial up-close view, scRNA seq has become recognized as one of the most powerful new approaches in cell biology. Two types of RNA are the intermediary molecules that help translate genes into proteins, so their presence in a cell indicates that a corresponding gene is active. It is now possible to separate and identify the sequence of nearly every RNA in a given cell so rapidly that thousands of cells can be analyzed at once in a tissue sample.

The technique can, for example, show researchers how the body’s development unfolds step by step in minute detail as cells differentiate from an initial stem cell state (in which they are capable of becoming any tissue type) and acquire their final “fate” in a particular tissue. When used to analyze tumors, scRNA seq has revealed that cancer is not simply a breakdown of the developmental process, a glitch that produces rogue, uncontrolled cell proliferation.

Instead, Bernstein says, “we’re learning that a brain tumor is sort of like a deranged recapitulation of normal development.” Single-cell RNA sequencing “opens your eyes to what is actually in the tumor,” he adds, “and the answer is: a lot more than tumor cells.” Tumors are not masses of identical cancer cells but a closely bound mixture of many cell types—including plenty of nonmalignant so-called healthy cells. Yet these nonmalignant cells, Bernstein says, “are not innocent bystanders.” They seem to help support the tumor somehow.

Bulletin Board

Gossip

MAY. 08, 2020

Though this situation makes the challenge of treating cancers seem more daunting, it could also make treatments ultimately much more effective. If researchers know which of the various types of malignant cells are present, they can tailor a specific cocktail of drugs to attack them. Such detailed information at the single-cell level “is clearly revolutionizing our understanding of cancer,” says Mario Suvà of Massachusetts General Hospital. Whereas previous work focused on certain functional properties of single cancer cells or genomics of the whole tumor, Suvà says, researchers are now seeing everything at the cellular level.

For instance, previous studies had seemed to suggest that one of four distinct types of cancer cells might be present in any given brain tumor, creating four different classes of tumor—each needing a different kind of treatment. Bernstein’s single-cell analyses of a particularly malignant type of brain tumor called a glioblastoma, however, revealed that *all four* cell types were typically present in every tumor he and his colleagues looked at. But they occurred in different proportions, so only the dominant type tended to be seen in bulk studies. “It was astounding to us,” Bernstein says. Rather than four distinct classes of tumor, single-cell analysis showed that there is a continuum of tumor type, each comprised of a mixture of those four malignant cell varieties (typically along with various healthy cells, too).

“We probably need a diagnostic test that could take a tumor and see which of the major cell groups are present,” Bernstein says. Researchers would then hit them with so-called combination therapies, which apply several different drug agents at once. Such mixtures are difficult to develop and test, he admits, but in the long run, they could be more effective at mopping up all the dangerous cells.

The different cell types in a tumor arise by differentiation from a kind of cancer “stem cell”—just as normal cells differentiate in ordinary tissues in a developing embryo. “Tumors mostly follow a similar hierarchy of starting in a stemlike state,” says Mariella Filbin, a pediatric neuro-oncologist at the Dana-Farber Cancer Institute and Boston Children’s Hospital, who has collaborated with Suvà’s team. But cancer cells do not quite make it to the usual fates of other cells, Filbin explains. “Some get stuck and just proliferate.”

Cancer cell differentiation also seems to be more fluid than that of healthy cells. “It’s not like a normal hierarchy, where you differentiate, and then you’re committed [to a fate],” Bernstein says. Cancer cells might differentiate a little bit and then revert, he adds. Such reversibility and

Bulletin Board

Gossip

MAY. 08, 2020

plasticity create real challenges for therapies that target one cell type: the interchangeability of these states gives cancer cells a survival strategy. “The tumors can become something else and escape our drug therapies,” Filbin says. “It’s very easy for them.”

Another problem is that some tumors might be mostly nonmalignant. In a study of squamous epidermal cancer of the head and neck three years ago, Bernstein and his colleagues learned that one group of patients’ tumors had a high number of seemingly ordinary fibroblasts—connective-tissue cells—which were derived from so-called epithelial cells. “Some tumors might just have 5 to 10 percent tumor cells, and the rest are nonmalignant cells sitting in the tumor ecosystem,” he says. But such tumors seem to be able to use these cells for malicious ends. In some cases, the healthy epithelial cells turn into earlier-stage mesenchymal cells, break free from the tumor and become mobile in the body. That is, these tumors reinitiate an earlier developmental process to bring about invasive metastasis, dispersing the cancer and making it very hard to treat. “None of this stuff comes out of bulk analysis,” Bernstein notes.

The disturbing ability of cancer cells to hijack healthy cells is illustrated in a recent report by Moran Amit of the University of Texas MD Anderson Cancer Center and his colleagues. By looking at the RNA profiles of cells in squamous tumor cells in the head and neck, they found those cancerous cells can reprogram ordinary neurons so that they promote tumor growth.

The new picture of cancer provided by scRNA seq might open possibilities for entirely new treatments. Suvà has used the technique to study tumors’ immune system—specifically, the T cells they contain, which are the main agents of our normal immune response. Boosting the immune system has already been found to give it the capacity to attack cancer cells. But doing so has only been effective for certain types of cancer—namely leukemias. Suvà hopes that studying the immune status of tumors might point to new options for such cancer immunotherapies. Looking cell by cell, he says, is “a powerful tool for the discovery of new biology.”

The insights this technique has already provided might suggest an even more dramatic cure. The unusual plasticity of cancer cells—which can transition back and forth between different states more readily than normal cells—means that instead of simply trying to kill them, it might be possible to “cure” them by guiding them gently back to a nonmalignant state. This process is called differentiation therapy, and Filbin is hunting for small-molecule drugs that can do it. She and her colleagues are exploring the approach for neuroblastoma, an aggressive form a cancer

Bulletin Board

Gossip

MAY. 08, 2020

that afflicts children's nervous system. (The new technique would be used after treatment with conventional chemotherapy and radiotherapy.) And a team in Germany and Italy tried treating a particularly challenging form of leukemia called APML (acute promyelocytic leukaemia) without chemotherapy at all. Instead the researchers only employed two differentiation agents: all-trans retinoic acid and arsenic trioxide. They found a nearly 98 percent survival rate for patients after 50 months. "This is differentiation therapy at its best," Filbin says. She and her colleagues have also found that differentiation can put cancer cells in a senescent state that eventually leads to cell death.

"Right now I'm treating brain tumors where we have nothing: they are resistant to chemo- and radiotherapies," Filbin says. "So we can't seem to kill those cells. But maybe we can differentiate them." If so, she adds, "I'd be the happiest woman on the planet."

[scientificamerican.com](https://www.scientificamerican.com), 21 April 2020

<https://www.scientificamerican.com>

No Evidence that COVID-19 is Transmitted through Food Packaging, Says FDA

2020-04-20

In an information sheet published by the U.S. Food and Drug Administration (FDA) on April 16, the Agency informed consumers that "... there is no evidence of food packaging being associated with the transmission of COVID-19." FDA added that consumers could wipe down grocery packaging materials but that would just act as an extra precaution. The information sheet is titled, "Shopping for Food During the COVID-19 Pandemic – Information for Consumers."

FDA provided this information to stakeholders last month. At a March 18 briefing for foods stakeholders on COVID-19, Frank Yiannas, Deputy Commissioner, FDA Office of Food Policy and Response, stated, "There is no evidence of food or food packaging being associated with transmission of Covid-19." Information on that briefing can be found on FDA's website.

[natlawreview.com](https://www.natlawreview.com), 20 April 2020

<https://www.natlawreview.com>

FDA added that consumers could wipe down grocery packaging materials but that would just act as an extra precaution.

Bulletin Board

Gossip

MAY. 08, 2020

Planes vs trans: High-speed rail set for coronavirus dividend

2020-04-15

Europe's demand for rail travel will increase over the next decade, according to new analysis that cites the public's new-found appreciation for cleaner air and climate issues as a result of the coronavirus outbreak. Airlines are predicted to be the main loser of the train resurgence.

Coronavirus lockdown measures have curtailed rail, maritime, road and air travel across Europe and have plunged airlines in particular into a fight for survival.

Empty skies and highways have also resulted in cleaner air, while a debate about whether governments should use public money to bail out the most polluting transport types is ongoing.

According to new analysis by UBS Research, that shift in perceptions will be a boon to Europe's high-speed rail market, which is on track to grow 10% every year this decade.

The Swiss firm predicts that the sector's market opportunity will grow to €11 billion by 2022, as the growth in demand will need more rolling stock and sweeping changes to infrastructure like signalling or even new track.

"In our view, and underpinned by lower financing costs, the political support for rail infrastructure investment is growing significantly," the UBS analysis insists.

Public support is also on the up. Rail operators have started reintroducing night-train services in response to demand, while tolerance for longer trips is also reportedly growing.

Business travellers would put up with a journey of four hours, the UBS data says, while leisure travellers could tolerate six. The analysis cites the London-Paris route as a prime example of where rail's city-centre departure and arrival points, and relatively short waiting times, allow it to triumph over airlines.

The European Commission said in March that 2021 should be "the European Year of Rail" as part of the EU's new green agenda, citing the transport mode's success in reducing emissions while preserving growth.

"There's no doubt that railway transport means huge benefits in most areas: sustainability, safety, even speed, once it's organised and

Airlines are predicted to be the main loser of the train resurgence.

Bulletin Board

Gossip

MAY. 08, 2020

engineered according to 21st-century principles,” said EU transport Commissioner Adina Vălean at the launch of the initiative.

Significant changes are on the horizon. By the end of 2020, France and Spain’s state-owned rail firms – SNCF and Renfe – will lose their long-held monopolies over domestic routes, as market liberalisation starts to take a firmer hold.

According to the UBS report, “liberalisation should improve frequency and affordability. 2019 and 2020 mark the inflection point for the industry.”

France and Spain, along with Italy and Germany, could add up to 800 new high-speed trains during the next decade, which could cost up to €60bn. The Bundesrepublik alone will invest more than €80bn in its network over the coming ten years.

SNCF intends to roll out brand-new versions of its TGV high-speed staple in 2023, with double-decker carriages that can carry more people. The cost per unit of the new model has also decreased, meaning its plans for an eventual 100-strong fleet are within reach.

Commissioner Vălean told EURACTIV during an interview that she would still like to see EU governments implementing the rules of the Fourth Railway Package, “which is not yet the case and which I was very keen to pursue this year.”

The transport chief also said that she would like to see the next long-term budget – the MFF – “used to put a focus on rail” by boosting investment instruments like the Connecting Europe Facility.

Taking on the airlines

High-speed services have scored notable wins against short-haul aviation in recent years. Eurostar’s cross-Channel route has more than halved air travel demand between London and Paris, the firm announced in 2019.

A new return service between the British capital and Amsterdam – due to launch this month but facing a de facto delay due to the pandemic – aims to do the same, as it falls within the four-hour window that analysts say favours train travel.

SNCF also teamed up with its Italian and Swiss counterparts last year in order to up their game against short-haul flights in and out of Switzerland.

The UBS data suggests that if its high-speed predictions pan out, global air traffic growth over the next decade will fall to just 4.6% per year, compared

Bulletin Board

Gossip

MAY. 08, 2020

with the 5.1% increase that was on the cards before the COVID-19 outbreak.

Within Europe, growth could stagnate or even fall. The study highlights the impact rail has already had on the London-Paris, Madrid-Barcelona and Munich-Berlin routes, as well as planned routes like Paris-Toulouse and Berlin-Cologne.

A wider and more efficient rail network might then push airlines into focusing more on long-haul services and short-haul flights that fall outside the four-hour rail window or serve areas not accessible to high-speed trains.

The industry might then have a better shot at meeting self-imposed emissions-cutting targets that are currently out of reach.

In 2010, UN aviation agency ICAO agreed to annual 2% fuel efficiency improvements and carbon-neutral growth as of 2020. According to industry figures, gains are more in the region of 0.8% and the latest estimates suggest that will only increase to 1.3% this decade.

Airlines say that route optimisation – managed in Europe by the Single European Sky system – is crucial to their efficiency drive, while increased usage of alternative fuels could also yield further improvements.

Further growth will have to be mopped up by ICAO's offsetting scheme, known as CORSIA, which is due to start a pilot phase next year. Companies will have to buy into renewable energy schemes and other projects that bring down emissions if they exceed their targets.

CORSIA intends to use 2019-2020 as the baseline for measuring growth but due to the huge fall-off in traffic predicted for the rest of this year, the industry is calling for just 2019 to be used instead.

If 2020 is included in the calculations then the gap between business-as-usual and growth will be higher and airlines will have to pay out more to keep their emissions at a neutral level. ICAO is scheduled to meet in the summer, when the issue will be discussed.

[euractiv.com](https://www.euractiv.com), 15 April 2020

<https://www.euractiv.com>

The fashion industry now accounts for 10% of global pollution, and is second only to aviation as the world's largest industrial polluter.

Bulletin Board

Gossip

MAY. 08, 2020

Trendy, Cheap, And Dirty: Fashion Is A Top Polluter

2020-04-23

- *The fashion industry is a major global polluter and source of greenhouse gas emissions, driven in large part by the “fast fashion” business model that treats cheap clothing as a perishable good that can be disposed of after brief use.*
- *Globalization has aided this trillion-dollar trend, allowing brands to outsource different links of their supply chains to countries with little to no environmental and labor protections in order to keep costs down.*
- *That has led to widespread pollution and labor rights abuses, particularly against women workers, epitomized by the collapse of the Rana Plaza building in Bangladesh on April 24, 2013, in which more than 1,134 workers were killed. This week, to mark the seventh anniversary of the tragedy and advocate for a return to a more sustainable “slow fashion” model, campaigners have launched the “Fashion Revolution Week.”*
- *A newly published review paper in Nature Reviews Earth & Environment highlights the environmental consequences of fast fashion, fashion’s complex international supply chain, and proposes solutions to bring us into a cleaner fashion future.*

Fast fashion and the environment

We live in a world of fast fashion, a model that relies on frequent, trend-driven, impulse buying of cheaply manufactured clothing that often ends up in the trash. The fashion industry now accounts for 10% of global pollution, and is second only to aviation as the world’s largest industrial polluter.

A newly published review paper in *Nature Reviews Earth & Environment* highlights the environmental consequences of fast fashion, fashion’s complex international supply chain, and proposes solutions to bring us into a cleaner fashion future.

“Clothing has become so cheap. Someone has to pay that price,” Kirsi Niinimäki, professor of design at Aalto University in Finland and corresponding author of the review paper, told Mongabay. “Often it is at the expense of the environment.”

The amount of clothing bought per capita has skyrocketed over the past few decades. Consumers bought 60% more clothing in 2014 than in 2000, but kept each garment half as long. In the U.S., people buy one item of clothing every 5.5 days, and across Denmark, Sweden, Norway and

Bulletin Board

Gossip

MAY. 08, 2020

Finland, purchases average 16 kilograms (35 pounds) of textiles per person per year.

Shoes, towels, clothing, sheets — these textiles have become a major source of municipal solid waste worldwide. Up to 92 million tons of textile waste per year is either burned or put in a landfill — an amount that would fill the Great Pyramid of Giza more than 16 times.

Clothing companies decide how much and what kinds of clothing to make based on the predictions of fashion forecasters, previous sale volumes, and a number of other factors. Sometimes, these estimates are wrong and companies are left with a bulk of unsold clothing. Often, after a period of storage, this unsold stock is burned or destroyed rather than being offered at a discount, which might damage a brand's image.

The British fashion brand Burberry burned or destroyed more than \$110 million worth of unsold clothing, perfumes and accessories between 2013 and 2018 rather than sell those items at a discount and "devalue our brand."

"We are tossing away our clothing like single-use plastics, like fast food," said Sam Hartsock, director of education at Remake, a nonprofit organization that educates the public about the human rights violations and climate injustices associated with the fashion industry. "Designers and companies are designing clothing for obsolescence. Because when you produce more, you have better margins, you have more profit, you have better revenue."

The supply chain for clothing is long and complex. Each step from fiber, yarn, and textile manufacturing to dyeing and garment sewing, to storage in a retail distribution center can happen in a different country. Dozens of people are involved in the creation of a single item of clothing, and that journey is wrought with waste: water, chemicals, CO₂ and plastic.

Textile manufacturing generates the highest amount of greenhouse gases per unit of material, with the exception of aluminum production. The Intergovernmental Panel on Climate Change says 10% of global greenhouse gas emissions are caused by the textile industry. Manufacturing, shipping and the subsequent machine washing of clothing all contribute to the carbon footprint of a garment.

The biggest carbon culprit in fashion is fiber production. Energy use and CO₂ emissions are highest during the fiber extraction process, especially when creating synthetic fibers, which originate from petrochemicals.

Bulletin Board

Gossip

MAY. 08, 2020

Synthetic materials like polyester, rayon, nylon and acrylic are essentially a type of plastic made from petroleum and can take hundreds of years to biodegrade. Synthetic polyester, for example, is made via a chemical reaction involving petroleum, coal, air and water. Polyester accounts for 51% of textile production.

The energy source used to fuel this production also matters. In China, textile manufacturing is largely coal-powered, giving it a 40% larger carbon footprint than textiles made in Europe.

Thirty-five percent of primary microplastics (particles less than 5 millimeters) in the ocean are linked to the fashion industry (190,000 tons per year). A lot of this is generated from washing synthetic materials such as acrylic and polyester (found in items like stretch jeans, leggings, and other cheap clothing).

Some of this plastic finds its way into our bodies through seafood. A WWF analysis suggests we may accidentally ingest a credit card's worth of plastic per week in the form of microplastics via drinking water, beer, shellfish and salt.

Fashion is also thirsty. Roughly 20% of global wastewater (79 trillion liters, or nearly 20 trillion gallons) is used in the fashion supply chain every year. Cotton is a notoriously water-intensive crop. Simply growing the cotton for one pair of jeans requires more than 2,500 liters (660 gallons) of water, roughly the amount of drinking water for one person for 3.5 years. Distressed jeans are even more water-intensive.

The human costs of fast fashion

On April 24, 2013, a total of 1,134 garment workers, mostly young women, were killed when the Rana Plaza building collapsed in Dhaka, Bangladesh. The building housed production for 29 major brands, and the tragedy drew the world's attention to the poor and unsafe working conditions many garment makers face.

Many workers in the fashion industry endure health and safety hazards and low wages. Garment workers in Ethiopia, for instance, earn a base wage of \$26 a month, where the monthly living wage is around \$100 per month. The U.S. Department of Labor reported evidence of forced labor and child labor in the fashion industry in Argentina, Bangladesh, Brazil, China, India, Indonesia, the Philippines, Turkey and Vietnam. H&M, Forever 21, GAP, and Zara are some of the recognizable brands that have been involved in child labor and forced labor scandals.

Bulletin Board

Gossip

MAY. 08, 2020

"How do you think you're able to get your cheap clothing?" Hartsock asks. "The fashion industry has to cut corners. And a lot of that really is about wages. This industry itself is also built on the exploitation of makers, particularly that of women."

The fashion industry is estimated to be a \$2.5 trillion industry that employs roughly 75 million people, of which, according to Hartsock, "80% are often women or sometimes children."

"Women are routinely fired for being pregnant. They are harassed and abused on the factory floor," Hartsock said. "Fast fashion tells this overwhelming heartbreaking story of violence not only to our planet but also violence to the women that make our clothes."

Recently, Remake's #PayUp campaign collected more than 5,000 signatures on a petition to demand that global brands with decreasing sales due to COVID-19 shutdowns "step-up to pay for previously placed orders to ensure that the most vulnerable people *within their own supply chains*, the women who make their products, are not abandoned during this perilous time."

Fashion companies look to cut costs by moving production to countries with little to no environmental regulations or where there is no need for pollution mitigation technology. In these cases, it is not only the local ecosystems that bear the brunt of chemical waste, but also the workers, who see increased health risk factors from chemical exposure.

How did we get here? A brief history of fast fashion

"This idea of fast fashion as we know it today, where more and more goods are churned out at lower prices, actually has a long history dating all the way back to the Industrial Revolution of the 19th century," April Calahan and Cassidy Zachary, fashion historians and hosts of the podcast *Dressed: The History of Fashion*, wrote in an email to Mongabay. The difference today, they say, is that "that pace has now become ever-quickenning."

The invention of the Jacquard loom in 1801 made the speed of creating textiles much faster and cheaper, as did assembly line production and synthetic dyes, invented in the 1850s. More abundant and low-cost textiles aided the development of the department store retail model, which depended on high sales volumes, lowering the cost per item of clothing.

Around the 1950s, ready-to-wear garments entered the market, particularly in Western department stores, giving more people across the economic spectrum a selection of clothing to choose from. The lowered

Bulletin Board

Gossip

MAY. 08, 2020

cost of these items drew the market away from handmade and artisanal clothing.

The present-day fast fashion model really took off in the late 1990s, following the establishment of the World Trade Organization (WTO) in 1995. With the WTO in place, global tariffs declined significantly, encouraging trade and opening markets across the globe. With global import and export tariffs reduced, the fashion industry was able to move each step of the supply chain to the country with the lowest bid.

“Novelty and accessibility is still a motivating factor for consumers of fast fashion, who patronize stores like H&M, Topshop and Zara,” Calahan and Zachary write. “Zara, in particular, is important to this conversation because of their implementation of QR or ‘quick response’ retailing in the early 2000s.”

Using new technologies, Zara established a system where garments could go from conception to clothing store in a matter of weeks. This allowed the store to escalate the pace of “trends” and refresh its inventory on a monthly or even weekly basis. New styles meant customers visited the stores more often and more clothing was sold.

“Fast fashion constantly offers new styles to buy, as the average number of collections released by European apparel companies per year has gone from two in 2000 to five in 2011, with, for instance, Zara offering 24 new clothing collections each year, and H&M between 12 and 16,” according to a European Parliament briefing.

“This has led to consumers to see cheap clothing items increasingly as perishable goods that are ‘nearly disposable,’ and that are thrown away after wearing them only seven or eight times.”

Forward into a slow fashion future

“Slow fashion is the future,” Niinimäki and co-authors conclude, but “we need a new system-wide understanding of how to transition towards this model, requiring creativity and collaboration between designers and manufacturers, various stakeholders, and end consumers.”

The authors call for manufacturers to invest in cleaner technologies, the fashion industry to employ sustainable business models, and policymakers to modify legislation.

The European Union appears to be leading the way in legislation. The circular economy package adopted by the EU in 2018 will, for the first

Bulletin Board

Gossip

MAY. 08, 2020

time, require that member states collect textile wastes separately from other recyclables by 2025. And, though not specifically aimed at fashion, the landfill directive requires member states to reduce municipal landfilled waste to 10% by 2035.

Designers can make changes such as creating low or zero-waste patterns (patterns where none of a piece of fabric goes unused). Designers can also create more classic and uniform collections with modifications for the traditional two to four seasons instead of the 12 to 24 collections per year now expected by fast fashion outlets.

“Designers can certainly make an impact, but without customers purchasing their responsible products, there is only so much they can do. It all comes down to consumer awareness and investment in change,” Calahan and Zachary write.

There are many groups and campaigns aiming to raise awareness around the perils of fast fashion. The slow fashion movement, much like the slow food movement, focuses on clean and fair production and emphasizes the artisanal. The #slowfashion tag reached around 500,000 people on a day on Twitter in late April 2020.

The nonprofit Fashion Revolution has launched its Fashion Revolution Week to campaign for systemic reform of the fashion industry this week, April 20-26, on the anniversary of the Rana Plaza building collapse.

Once a consumer knows what goes into putting a shirt on their back, what are they to do? While consumers alone cannot bear the brunt of changing an entire industry, increasing the demand for slower and more sustainable fashion may have some power to shift the market.

Niinimäki and colleagues urge consumers to move away from the idea of fashion as cheap entertainment; to engage in slower, more conscious consumption; and to extend the use time of each garment through investment and care.

Brands that promote more sustainable fashion choices are often more expensive. This is because, according to Hartsock, these prices reflect the true cost of paying fair wages and not cutting corners to avoid environmental regulations. However, these pieces are typically made of higher-quality fabrics and stitching and will last longer.

“Invest in a piece then learn how to take care of it,” Hartsock said. “Do you need five pairs of jeans or can you buy like one nicer pair and make it last?”

Bulletin Board

Gossip

MAY. 08, 2020

Washing clothing less often, using less harsh detergents, and mending or repairing clothing are all ways to ensure clothing lasts longer and higher-quality pieces give a greater return on investment.

Shopping for used clothing (vintage, thrift, secondhand) is among the major recommendations for those hoping to fight fast fashion's seedy underbelly while saving money. The used clothing industry is booming, with \$28 billion in sales reported in the U.S. in 2019, and the industry is expected to continue to grow as Generation Z adopts secondhand fashion more than twice as fast as other age groups. Clothing swaps have also become more popular and contribute to a circular versus linear model for fashion.

"It will take a massive shift in consumer mentality to effect change on a global scale," Calahan and Zachary write. "This may be a generational shift in terms of consumers' system of values and how they see their role the continued health of the planet.

[news.mongabay.com](https://www.news.mongabay.com), 23 April 2020

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

USDA Let Millions Of Pounds Of Food Rot While Food-Bank Demand Soared

2020-04-26

Tens of millions of pounds of American-grown produce is rotting in fields as food banks across the country scramble to meet a massive surge in demand, a two-pronged disaster that has deprived farmers of billions of dollars in revenue while millions of newly jobless Americans struggle to feed their families.

While other federal agencies quickly adapted their programs to the coronavirus crisis, the Agriculture Department took more than a month to make its first significant move to buy up surplus fruits and vegetables — despite repeated entreaties.

"It's frustrating," said Nikki Fried, commissioner of agriculture in Florida. Fried, who is a Democrat, and much of the Florida congressional delegation asked Agriculture Secretary Sonny Perdue nearly a month ago to use his broad authority and funding to get more Florida farmers plugged into federal food purchasing and distribution programs as the food service market collapsed. "Unfortunately, USDA didn't move until [last week]."

Images of farmers destroying tomatoes, piling up squash, burying onions and dumping milk shocked many Americans who remain fearful of supply shortages.

Bulletin Board

Gossip

MAY. 08, 2020

Tom Vilsack, who served as agriculture secretary during the Obama administration, put it this way: "It's not a lack of food, it's that the food is in one place and the demand is somewhere else and they haven't been able to connect the dots. You've got to galvanize people."

It has been six weeks since President Donald Trump and the Centers for Disease Control and Prevention first urged Americans to avoid restaurants as part of national social distancing guidelines to slow the spread of Covid-19 — a move that immediately severed demand for millions of pounds of food earmarked for professional kitchens across the country.

Just 50 miles from Trump's home in Mar-a-Lago, Florida growers, much of whose produce was destined for restaurant chains, faced an immediate crisis: Find customers for surplus crops or plow the fields under to avoid attracting pests.

Images of farmers destroying tomatoes, piling up squash, burying onions and dumping milk shocked many Americans who remain fearful of supply shortages. At the same time, people who recently lost their jobs lined up for miles outside some food banks, raising questions about why there has been no coordinated response at the federal level to get the surplus of perishable food to more people in need, even as commodity groups, state leaders and lawmakers repeatedly urged the Agriculture Department to step in.

Demand at food banks has increased an average of 70 percent, according to Feeding America, which represents about 200 major food banks across the country. The group estimates that 40 percent of those being served are new to the system.

In mid-April, USDA unveiled a long-awaited \$19 billion aid program with \$3 billion set aside to buy excess food, a pot of money that would cover a major ramp-up of fresh produce purchases, along with dairy and meats. But federal officials predicted it would take the better part of a month before that food is packed and shipped to food banks and other nonprofits in need. At that point, it will be too late for many produce growers who saw a huge drop in demand right at the peak of their season.

"By the time that comes through, it won't help Florida," said Brittany Lee, a blueberry farmer and executive director of the Florida Blueberry Growers Association. Blueberry prices are about half of what they were this time last year, she said.

Bulletin Board

Gossip

MAY. 08, 2020

The Agriculture Department said it has moved expeditiously to respond to the crisis.

“USDA is committed to maximizing our services and flexibilities to ensure children and others who need food can get it during this coronavirus epidemic,” Secretary Sonny Perdue said in a statement to POLITICO. “This is a challenging time for many Americans, but it is reassuring to see President Trump and our fellow Americans stepping up to the challenges facing us to make sure kids and those facing hunger are fed.”

Department officials declined requests to discuss the government’s approach to capturing the perishable food glut. A spokesperson noted that the department distributes about \$2 billion in agricultural products every year to schools, food banks, tribal organizations and others. That number doubled to \$4 billion last year as USDA bought up more commodities to help compensate farmers harmed by the trade war.

Nonetheless, the coronavirus catastrophe has laid bare just how tied up in red tape the USDA’s commodity buying system can be. The process typically takes months from start to finish. And the department has historically focused on buying foods that can be stored for long periods — like canned fruit and meats and cheeses — and so is not accustomed to handling an influx of fresh food.

Sudden plunge in demand

In March, about a week after much of the country shut down restaurants, events and other food-service businesses, several produce groups wrote to USDA with an urgent plea to buy perishable commodities because at least \$1 billion was “sitting stagnant in the supply chain.”

“There is no reason these high-quality, nutritious, farmer-grown products should be left in facilities to rot when there are so many American families who are suddenly faced with food insecurity,” the groups wrote to Perdue. “These growers and companies are already donating to food banks and others in need and will continue ... but they are also facing their own economic crises.”

The department did not make any fresh purchases in response to that request, according to USDA records. Perdue has yet to respond to the letter.

Shutting down restaurants, cruise ships, hotels and schools may have been crucial for stopping the spread of the virus, but it quickly became a train wreck for the food system. The food-service sector represents about half

Bulletin Board

Gossip

MAY. 08, 2020

of the food dollars spent and a quarter of food consumed in the country. Some 40 percent of the country's fresh produce goes into food service, as consumers increasingly prefer to eat vegetables if someone else is preparing them.

The precipitous drop in demand left many growers with no choice but to trash excess food or leave it in the fields because the cost of picking, packing and storing the crops would only put them further in the hole. Some with more resources in hand took on the cost of harvesting and donating the food themselves, but the gut-wrenching reality is that crops are being abandoned on an unprecedented scale.

A handful of states, including Florida and California, set up online clearinghouses to try to match up excess food with need in their area, but the high volumes of surplus produce often can't be absorbed by local food banks alone, making national distribution important for making even a dent in the waste.

Paul Allen, co-owner of RC Hatton Farms, is currently disking hundreds of acres of cabbage — a process that grinds crops into the soil — because there's simply no market for it. It's heartbreaking to watch, but the cabbage he grows is typically used for coleslaw at restaurant chains like KFC. Allen estimates he's left about 8 million pounds of cabbage and 4.5 million pounds of green beans in the fields.

"We've been devastated," Allen said. His company has already donated hundreds of thousands of pounds of vegetables to food banks. The company also sent containers of produce to the Bahamas and paid for the cost of harvesting to make it all happen.

Now, Allen says, he must decide how many of his crops are better left unpicked, not knowing when much of his customer base will be able to reopen for business. "Do I keep taking on more losses?" he said, noting that vegetable growers have already spent several thousands of dollars per acre before harvest. "But if I stop growing food for our country, that's a bigger problem yet."

Growers take aim at USDA

Produce industry leaders, including Allen, are also furious that USDA plans to impose payment limits for the rest of its aid to farmers affected by coronavirus. The department said in mid-April that agricultural producers would be limited to \$125,000 per commodity or \$250,000 total to help

Bulletin Board

Gossip

MAY. 08, 2020

compensate them for damages as it hands out \$16 billion in direct payments.

“We begged them not to put a cap on it,” Allen said. Farmers who grow fruits and vegetables have extremely high costs per acre and often plant at such a large scale that the payments won’t even begin to cover their losses. It typically costs less than \$700 per acre to grow commodity soybeans. It costs more than \$4,000 per acre to grow cabbage. “What is fair is not always equal,” he said.

While \$250,000 is a lot of money for most Americans, it represents about one day’s harvest for RC Hatton.

Nearly a third of lawmakers in the House recently asked Perdue to scrap the limits citing “unprecedented damage.”

The scale of produce waste is staggering. Farmers in Florida, which provides much of the fresh produce to the eastern half of the U.S. during the winter and spring, left about 75 percent of the lettuce crop unharvested, along with significant portions of the state’s sweet corn, cabbage and squash. Up to 250 million pounds of tomatoes could end up left in the fields, according to the Florida Department of Agriculture & Consumer Services. Florida officials estimate produce growers there have taken a half a billion dollar hit. In California, the industry is projected to lose more than \$1 billion per month.

Tony DiMare, who’s been in the produce business for almost 40 years, said he’s never experienced such a dramatic disruption in demand. “It came to a screeching halt,” he said. It was especially devastating for growers of Florida tomatoes, 80 percent of which are sold into food service.

Toby Basore, a grower based in Western Palm Beach County, Fla., estimates his company disced somewhere between 8 and 10 million pounds of lettuce into the ground in recent weeks due to lack of demand.

“We had a chance of having a really good season before this hit,” said Basore. “You just can’t plan for something like this.”

The dairy industry, for its part, estimates that its supply is currently 10 percent greater than domestic demand, in part because of the closure of thousands of K-12 schools, which are usually significant consumers of milk. The upheaval has strained dairy processors’ ability to turn milk into more storable products like cheese. The International Dairy Foods Association says about 5 percent of the country’s milk is currently being dumped.

Bulletin Board

Gossip

MAY. 08, 2020

Now, the problems in Florida are expected to migrate to other major growing areas that are just beginning their harvest seasons, including California, Georgia and South Carolina.

An attempt to make good

USDA's new aid package is aimed at cushioning the blow. The department says it will spend about \$100 million per month on fresh fruits and vegetables, as well as \$100 million each for dairy and cooked meat products every month for the next six months. The products will be sorted into variety boxes — reminiscent of the Trump administration's widely-panned "Harvest Box" plan, which aimed to transfer a portion of food stamp benefits into a pre-selected box of shelf stable and canned foods.

It's not yet clear exactly what will go into the boxes. Officials have listed several likely possibilities, including precooked pork and chicken; yogurt, butter and milk; and various produce items, including apples, oranges, tomatoes, blueberries and salad mixes.

USDA officials said that they are trying to get the boxes out the door as quickly as possible. The normal procurement process is complicated enough that it requires a flow chart to outline the steps a business must take to become a supplier.

"We are attempting to move at lightning speed," David Tuckwiller, director of commodity and procurement at the USDA's Agricultural Marketing Service, said last week. The department is greatly compressing its typical procurement timeline with the goal of shipping the first food boxes by May 15, officials said.

At that point, it will have been two months since the food service supply chain blew up.

Industry groups praised the new program as a step in the right direction and a down payment on the type of aid they need, but most stakeholders seem to agree it's not nearly enough.

The United Fresh Produce Association estimates its members are losing out on \$1 billion per week.

"We are super frustrated that they're not being aggressive enough," said Dennis Nuxoll, a top lobbyist for Western Growers. USDA has the money and the authority to buy several times more than what they've outlined, Nuxoll said. "It's a sound idea, but it doesn't match the magnitude of need."

Bulletin Board

Gossip

MAY. 08, 2020

“This thing is a joke,” said DiMare, who listened to the USDA’s recent briefing on the purchase program. He appreciates the department’s intentions, he said, but quickly counts off the program’s deficiencies: It’s not clear how many companies are set up to pack mixed varieties of produce into boxes. What happens to highly specialized growers? If a business only grows tomatoes, will it have to go find other vegetables for the box, or will everyone sell to a third party? Most painfully, the program simply won’t be up and running in time to help Florida, where the season is winding down.

DiMare’s company, DiMare Fresh, has donated over a million pounds of tomatoes to food banks in his area, but he still had to leave some 10 million pounds in the field, he said.

Meanwhile, he said he continues to get calls from food banks elsewhere in the country that need produce, but don’t have the money to cover the costs of harvest, packing and shipping it to where they need it.

Some growers have gotten creative. When Idaho farmer Ryan Cranney suddenly found himself with millions of potatoes he couldn’t sell, he decided to pile them up outside and invite the public to come take what they’d like for free.

“At first I thought we’d have maybe 20 people,” Cranney said in an interview. Thousands of people have now driven to Cranney Farms in Oakley, a town of 700, to take him up on the offer. “About 60,000 people could have about a 10 pound bag a piece ... we saw people from as far away as Las Vegas, which is an eight-hour drive from here.”

“If we as a country have more understanding of our food chain and where our food comes from and really what that means to farmers and the distribution system, maybe we’ll be able to change things where we’re not quite as vulnerable going forward,” he said.

[politico.com](https://www.politico.com), 26 April 2020

<https://www.politico.com>

Evidence of potential harm from these drugs is beginning to trickle out.

Bulletin Board

Gossip

MAY. 08, 2020

Antimalarials Widely Used Against COVID-19 heighten risk of cardiac arrest. How Can Doctors Minimize the Danger?

2020-04-21

On 19 March, as much of the United States shut down to contain the new coronavirus, genetic cardiologist Michael Ackerman and his wife drove 7.5 hours to retrieve their son from college. On the radio, they heard medical experts discussing chloroquine and hydroxychloroquine, two antimalarial drugs that **President Donald Trump had just touted at a press briefing**, despite no conclusive evidence that they can treat COVID-19. A doctor on the show asserted that the drugs have proved to be completely safe because they've been used against malaria for decades and are also used to tame overactive immune cells in lupus and rheumatoid arthritis.

"I was kind of going crazy in the car," Ackerman remembers. "My wife was like, 'Settle down, settle down.'" At the Mayo Clinic, Ackerman treats patients predisposed to heart arrhythmias because of genetic conditions. Chloroquine and hydroxychloroquine, he knows, have a potentially fatal side effect: They can cause a type of irregular heart rhythm that sometimes leads to cardiac arrest. "The side effect is rare—that's the great news," Ackerman says. But doctors can't say just how risky these drugs are for gravely ill COVID-19 patients based on data from other groups of people who have taken them over the decades. The expert on the radio was comparing, "not apple to oranges, but apples to watermelons," he says.

Ackerman soon heard another perspective that troubled him: In the battle against COVID-19, the risk of arrhythmia was "friendly fire" that doctors would just have to accept. So he and his colleagues drafted what they called "**urgent guidance**," published 25 March in Mayo Clinic Proceedings, explaining that doctors can prevent deaths by identifying and monitoring the people at greatest risk—and if an arrhythmia appears, withdrawing the drugs or taking other measures to stabilize the heart.

Treating COVID-19 patients with hydroxychloroquine, a derivative of chloroquine generally thought to have less severe side effects, has become standard at many hospitals. The drug is often combined with the antibiotic azithromycin, which some studies suggest also has antiviral effects. The U.S. Food and Drug Administration has **authorized emergency use** of both chloroquine and hydroxychloroquine for COVID-19 patients. But no large, randomized trial has proved these drugs—alone or in combination with azithromycin—are effective against the disease.

Bulletin Board

Gossip

MAY. 08, 2020

“You can never make any risk zero,” says Athena Poppas, a cardiologist at Brown University. “If the benefits were clearly shown to be high, then we might take an x% risk of sudden death,” she says, “but we don’t even have [evidence of] benefit. We have theory.”

Evidence of potential harm from these drugs is beginning to trickle out. A clinical trial in Brazil that gave chloroquine and azithromycin to 81 people hospitalized for COVID-19 was halted after investigators found **more deaths in the group getting the higher of two doses**, according to a preprint the team published on 16 April on medRxiv. Electrocardiography (EKG) readouts indicating increased arrhythmia risk were also more common in the high-dose group. Researchers conducting the trial received death threats on social media, and conservative media outlets accused them of giving patients excessively high doses to purposely smear the drug.

An analysis of data from 368 U.S. veterans treated for COVID-19, posted in a preprint today, found the risk of death from any cause **was greater for those who received hydroxychloroquine** than for those who didn’t, even after researchers adjusted for the fact that patients with more severe disease were more likely to receive the drug. And a woman in New York died this month after her general practitioner prescribed hydroxychloroquine and azithromycin for coronaviruslike symptoms, NBC News **reported last week**. (There’s no proof that drug-induced arrhythmia caused her death, Ackerman says, “but it smells awfully fishy.”) Now, researchers are trying pin down the rates of this side effect in COVID-19 patients and are urging diligent heart monitoring during treatment.

“When the media says this looks to be a safe drug—in certain contexts, that’s true,” says Wesley Self, an emergency physician at Vanderbilt University conducting a clinical trial of hydroxychloroquine. “However, when you’re talking about potentially treating millions of patients, even rare side effects become very important.”

Doctors think chloroquine and hydroxychloroquine might help COVID-19 patients by **inhibiting the coronavirus from entering cells** and by taming a potentially deadly overreaction of the patient’s immune system. But **a small trial in France** that lent initial support to hydroxychloroquine as a COVID-19 treatment **has been widely criticized** for methodological flaws, including a failure to randomize the study groups. And subsequent small trials—including **a randomized study of 150 patients in China**, posted last week as a preprint—haven’t found evidence of effectiveness.

Bulletin Board

Gossip

MAY. 08, 2020

The potential for arrhythmia, meanwhile, is well-documented. Chloroquine and hydroxychloroquine block channels on heart muscle cells that control the flow of ions, which governs the heart's electrical recharging between beats. Doctors gauge the heart's ability to properly recharge with an EKG readout called the QT interval. If this phase of electrical activity goes on too long—more than about one-half of a second—the heart can enter an irregular rhythm that can cause it to stop beating altogether.

Azithromycin raises concerns because it, too, can block ion channels and tinker with the heart's electrical pattern. The rationale for adding it to hydroxychloroquine is murky, many researchers say. But the French study found that patients cleared the virus faster with the two-drug cocktail than with hydroxychloroquine alone. "That study, however poorly designed and conducted, made a difference," says Daniel Prieto-Alhambra, a pharmacoepidemiologist at the University of Oxford. "People started using the data to make decisions."

In a preprint posted on 10 April on medRxiv, Prieto-Alhambra and colleagues looked for clues about the safety of this combination in the medical records of nearly 1 million people in six countries taking hydroxychloroquine for rheumatoid arthritis. More than 300,000 of them also took azithromycin at some point to treat an infection. The researchers found that a person's risk of heart failure in the month after starting hydroxychloroquine was comparable to the risk from starting another common arthritis drug, sulfasalazine. But in the month after adding azithromycin to hydroxychloroquine, **the risk of cardiovascular death more than doubled.**

And there's reason to think heart complications will be more common in people with a coronavirus infection than in those with autoimmune disease, says Lior Jankelson, a cardiac electrophysiologist at New York University (NYU). Hospitalized COVID-19 patients tend to be older, and some are already taking other drugs that can extend their QT interval. Because pre-existing heart conditions seem to increase the severity of COVID-19, many patients may already be at risk of arrhythmia. And **the virus itself can attack many organs**, including the heart and kidneys, damage that can bump arrhythmia risk higher as a patient deteriorates.

Jankelson and his colleagues recently measured changes in QT interval for 84 COVID-19 patients who received hydroxychloroquine and azithromycin at NYU's Langone Medical Center. Although none went into cardiac arrest during the study, **11% had QT intervals so prolonged that they were considered at high risk of arrhythmia**, the researchers reported on 3

Bulletin Board

Gossip

MAY. 08, 2020

April in a medRxiv preprint. (They are now following up those results in a larger group of COVID-19 patients.) They also found that a normal QT interval before starting the drugs did not indicate that a person would avoid dangerous QT prolongation. In other words, it's not just the people with an obvious risk of arrhythmia who could develop cardiac side effects when they get the drug cocktail.

That finding suggests vigilance will be key, Jankelson says. "I probably would not prescribe the drug if I could not ensure continuous ... [daily EKG] monitoring." Many hospitals, including Jankelson's, rely on telemetry—continuous heart monitoring at the bedside. And there are several technologies for taking an EKG reading at home and transmitting it to a doctor, he notes, though it's not clear how commonly they're used to monitor COVID-19 patients outside the hospital.

The **Infectious Diseases Society of America**, the **American College of Cardiology**, and the **U.S. National Institutes of Health** all recommend that patients only receive chloroquine or hydroxychloroquine in the context of a clinical trial until there is more evidence that the drugs are effective. Careful screening and monitoring are common in such trials. For example, a 510-patient study of hydroxychloroquine known as ORCHID, funded by the U.S. National Heart, Lung, and Blood Institute, excludes COVID-19 patients who have an abnormally long QT interval, have a history of a QT-prolonging condition, or take potentially QT-prolonging drugs.

"We've spent innumerable hours thinking about how we safely monitor all of this in the context of clinical research," says Matthew Semler, a critical care physician at Vanderbilt who, with Self and others, helped design ORCHID's protocol. "And yet the same benefits and risks are posed ... as a part of clinical practice, and that has essentially no regulation, and is widely variable."

The current situation with hydroxychloroquine "is exactly what we try and avoid in medicine—hundreds of thousands of patients are being administered this medication outside of the context of research in which we can learn about its safety and efficacy," Semler adds. "That's a dangerous situation to be in."

sciencemag.org, 21 April 2020

<https://www.sciencemag.org>

Pronounced EYE-sox-Ah-FLUTE-ole, isoxaflutole is a highly toxic pesticide the EPA has linked to cancer and liver damage.

Bulletin Board

Gossip

MAY. 08, 2020

Op-Ed: Ever Heard Of Isoxaflutole? That's About To Change

2020-04-24

Across the country, many people who've never stepped into a soybean or corn field are familiar with pesticides like the cancer-linked glyphosate in Roundup and drift-prone dicamba.

But chances are slim that anyone outside the pesticide and farming industries has heard a whisper about isoxaflutole, which earlier this month the Environmental Protection Agency announced it had approved for use on as much as 90 million acres of genetically engineered soybeans in 25 states throughout the Midwest.

And that's exactly how EPA administrator Andrew Wheeler wants it.

Pronounced EYE-sox-Ah-FLUTE-ole, isoxaflutole is a highly toxic pesticide the EPA has linked to cancer and liver damage. And much like dicamba, it's well-known for its ability to drift more than a thousand feet from where it's sprayed, creating potential for broad, unintended damage to nearby crops, backyard gardens and native plants.

The EPA's announcement that isoxaflutole had been approved for use on millions of acres of genetically engineered soybeans without any prior public notice spotlights how aggressively the Trump EPA under Wheeler's iron hand has moved to exclude the public and independent scientists from the pesticide approval process.

In making the EPA over in his own secretive, corporate image, the former coal lobbyist has broken with the decades-long practice of providing public notice of comment periods on pending pesticide decisions known to be of broad interest.

Instead, Wheeler orchestrated a covert safety review process that did not provide any public notice that a comment period was open while at the same time actively soliciting comments from pesticide and industrial farming interests.

As a result, the agency received nothing but glowing reviews of its proposed action while the public and leading independent scientists were purposefully excluded from the approval process.

Far from an exception, the behind-closed-doors approach to approving dangerous poisons sprayed on America's cropland has become business-as-usual under an autocratic Trump EPA.

Bulletin Board

Gossip

MAY. 08, 2020

This same opaque process was used last year when the EPA suddenly re-approved and expanded use of the bee-killing sulfoxaflor, a neonicotinoid insecticide that it approved for use across 200 million acres of cotton, corn, sorghum and citrus crops.

A few years after the EPA's original approval of the pesticide in 2013, the Ninth Circuit Court of Appeals cancelled the approval of sulfoxaflor after determining the agency based its decision on flawed and limited data.

Thereafter, to achieve its goal of re-approving sulfoxaflor, the Trump EPA made sure no one was able to register their complaints about the disturbingly pro-industry bias of its review by offering no public notice or chance for independent researchers to comment on the re-approval decision.

The same failure to notify the public allowed the EPA to quietly extend so-called "emergency" use of the medically important antibiotic streptomycin on citrus crops in Florida and California this year.

The "emergency" approvals were highly controversial not only because they sidestepped the normal safety reviews but because the World Health Organization has discouraged overuse of streptomycin due to the fact that it is considered "critically" important to treating human diseases, including tuberculosis.

The massive expansion of isoxaflutole use vividly exposes the dirty secret of those who profit off pesticides and genetically engineered seeds: The push to facilitate the use of genetically engineered crops is increasingly accompanied by a dramatic increase in pesticide use.

As a result herbicide use is skyrocketing in the U.S., up 30 percent from 2005 to 2012.

The unavoidable truth is that it's only a matter of time before plants will develop resistance to isoxaflutole—as they have already done for glyphosate and dicamba.

And that means it's only a matter of time before those who profit off of pesticide-intensive farming will insist on adding yet another poison to the ever-growing number dumped on hundreds of millions of acres of U.S. cropland.

ehn.org, 24 April 2020

<https://www.ehn.org>

Bulletin Board

Gossip

MAY. 08, 2020

Covid-19 May Worsen the Antibiotic Resistance Crisis

2020-04-23

GROWING EVIDENCE SUGGESTS that, as the Covid-19 pandemic moves across the world, it may drag a second slow-motion pandemic behind it. Even though Covid-19 is a viral illness not affected by antibiotics, early data from hospitals shows that very high proportions of patients—more than 90 percent in some cohorts—are being treated with those drugs to cure or protect against secondary infections during respiratory illnesses or hospitalization. That's being accompanied by an unmeasured but possibly huge number of people taking antibiotics on their own, or with the encouragement of fringe researchers, in misguided attempts to protect themselves.

Those parallel phenomena mean that Covid-19 could whomp up antibiotic resistance, pathogens' adaptive ability to defend themselves against drugs intended to kill them. Resistance is already a crisis: It causes an estimated 700,000 deaths around the world each year, almost four times the death toll from the novel coronavirus so far. Diminishing the power of antibiotics could undermine an important part of the medical response to Covid-19.

A further complication: If increases in resistance occur, there won't be drugs to fix the problem. Antibiotic manufacturers have been abandoning the market, and some have gone bankrupt, because resistance causes their products to become less lucrative. With drug companies pivoting to searching for coronavirus treatments, there's a real risk that research into new antibiotics could fall years behind.

"The use of antibiotics anywhere contributes to the emergence of resistance everywhere," says Kathy Talkington, director of the antibiotic resistance project at the Pew Charitable Trusts. "What we are hearing anecdotally is that more and more antibiotics are being used in this pandemic—and you can imagine that if they are being used more in the United States, then other countries facing the challenge of how to best address Covid-19 are ramping up as well."

A subtle sign of the growing concern over this is that, in the past month, a number of prominent antibiotic resistance researchers placed op-eds in publications in several countries, in what they say is not a coordinated campaign but an organic expression of how worried these trends make them. The pleas have appeared in magazines, newspapers, trade publications, on the sites of nonprofit organizations, and in personal blogs.

Resistance is already a crisis: It causes an estimated 700,000 deaths around the world each year, almost four times the death toll from the novel coronavirus so far.

Bulletin Board

Gossip

MAY. 08, 2020

What may have been the first was published on March 23 by Julie L. Gerberding, a physician who was director of the US Centers for Disease Control and Prevention during the George W. Bush administration and now is the chief patient officer and an executive vice president at Merck. She wrote: “The challenge of antibiotic resistance could become an enormous force of additional sickness and death across our health system as the toll of coronavirus pneumonia stretches critical care units beyond their capacity.”

The researchers who are writing these pieces say they felt the need to nudge the problem into public attention now, while governments are debating stimulus spending that could steer some financial support to antibiotic makers. Securing the antibiotic pipeline, they say, is as important in defending against the coronavirus as finding treatments and vaccines.

“In the context of Covid-19, antibiotics should be considered as important as protective gowns or facemasks,” says Adam Roberts, a microbiologist and antibiotic discoverer at the Liverpool School of Tropical Medicine. “We do not expect healthcare workers to go into hospital situations without the correct protective equipment. Nor should we expect clinics to do their job without the appropriate antibiotics. It is part of our defense for any pandemic situation.”

Pneumonia caused by a bacterial infection is an old fellow-traveler to viral pandemics. In 2008 scientists reviewed a raft of scientific literature from the 1918 flu, and also reexamined tissue samples stored from autopsies done during that outbreak. They concluded that “the vast majority” of the possibly 100 million deaths in 1918-19 were caused not by influenza, but by a bacterial infection taking hold in lung tissue that had been traumatized by the flu virus. (The authors included Jeffery Taubenberger, a virologist who achieved the extraordinary scientific feat of recovering the 1918 virus from autopsy samples, and Anthony Fauci, the physician who directs the National Institute of Allergy and Infectious Diseases and has become the science star of the current pandemic.)

One year after that analysis was published, the 2009 H1N1 flu epidemic began. That outbreak was initially considered mild: The World Health Organization estimated at the time that only 18,449 people had died. Researchers at the Centers for Disease Control and Prevention subsequently determined that was a vast undercount, and the death toll was likely 284,000—and a second team of researchers estimated that up to 55 percent of that much larger number of deaths were caused not by

Bulletin Board

Gossip

MAY. 08, 2020

the initial assault of the flu, but by a bacterial pneumonia coming along afterward.

The Covid-19 pandemic is still too new to know for certain what proportion of patients develop pneumonias caused by bacteria. But in the papers published so far, there are clues that bacterial infections may be playing as large a role as they did in past pandemics, and therefore might drive increased antibiotic use. One of the first studies outlining what happens to patients in Covid-19 infection, which was published March 11 by physicians in Wuhan, China, described the experience of 191 patients in two hospitals. The physicians found that 15 percent of the patients developed secondary bacterial infections, and half of those who did died.

Roberts and friends have just stood up a site on which they are collecting any new scientific papers that discuss secondary bacterial or fungal infections or antibiotic use in Covid-19. As of Wednesday morning, they had identified 22 peer-reviewed papers and three preprints. A sample of what they've found: In Paris, 33 percent of Covid-19 patients were also infected with aspergillus, a frequently drug-resistant fungus that takes hold in people with compromised immune systems; in a separate small study of French patients, one out of five had bacteria and fungi in his lungs. In one set of Chinese patients, 27 percent had a secondary bacterial infection; in another cohort, what authors described as "a large proportion" did.

More worryingly, the papers show that very high proportions of patients hospitalized with what is presumed to be Covid-19 are receiving antibiotics, not to treat diagnosed bacterial infections but as insurance and protection once they are admitted to intensive care units or put on ventilators. In that first Chinese cohort, 95 percent of the patients received antibiotics. In other papers Roberts and team have collected, the proportions are just as high, with 100 percent, 98.5 percent, 93 percent, 89 percent, 64 percent, 58 percent and 45 percent of sets of patients in various places receiving antibiotics as part of their Covid-19 care.

In normal times, those rates would be unthinkable high. Physicians and hospitals try to stick to a set of practices, broadly known as antibiotic stewardship, that are meant to confine antibiotic use to when the drugs are really needed. A key principle of stewardship is making sure that the infections a patient is experiencing are identified and lab-confirmed. That way, physicians can fit the choice and dose of antibiotic to the pathogen infecting a patient and to any resistance that is already present.

Bulletin Board

Gossip

MAY. 08, 2020

It is not routine practice to give antibiotics simply because someone has been placed on a ventilator. But in Covid-19 care, diagnostic procedures that would justify antibiotics—such as snaking a tube into the lungs for a visual exam or retrieving samples of lung fluid—expose health care workers to too much risk. That means no samples to send to the clinical microbiology lab, to determine whether bacteria and fungi are present alongside the virus. And that may lead physicians to prescribe empirically and just in case.

“It worries me that we could end up with loosening of stewardship practices, and a lot of broad-spectrum antibiotic use beyond what we usually have,” says Cornelius J. Clancy, an infectious-disease physician who researches antibiotic use patterns. “And that could be exacerbated by shortages, or supply issues from different parts of the world.”

Stack this concern about extra hospital use, and the resistance it will likely provoke, on top of uncontrolled community use. The antibiotic azithromycin is half of the indie preventive treatment (along with hydroxychloroquine) that was promoted by a physician in France, took off across Silicon Valley, and was pushed relentlessly by the White House and Fox News. There is little evidence this combo works: Just this week, a new preprint study from researchers at the Columbia VA Health Care System in South Carolina, the University of South Carolina and the University of Virginia showed that hydroxychloroquine not only doesn't protect against Covid-19, but is associated with higher rates of death. (This study is considered preliminary: As a preprint, it has not yet been through peer review or published in a medical journal.)

Nevertheless, according to the Food and Drug Administration, there has been such a spike in azithromycin use that nine different manufacturers have reported shortages they cannot resolve for months.

Azithromycin isn't the only antibiotic being put to nonstandard use for Covid-19. New papers and preprints show that physicians are experimenting with amoxicillin, tetracycline, doxycycline, and teicoplanin, a last-resort drug used against MRSA, to try to prevent coronavirus infections. That all adds up to vast amounts of excess use, and to enhanced risks of resistance emerging and undermining the power of those drugs.

That's a problem, because resistance is already potent: In parts of the US, the major bacterial cause of pneumonia defeats the first-choice antibiotic used for it more than half the time. It's equally a problem because so few new drugs are available to replace them. Last week, the Pew Trusts released new data showing that antibiotic development is fragile: More

Bulletin Board

Gossip

MAY. 08, 2020

than half of the new drugs in the pipeline are still in Phase 1 or 2 trials, putting them years from approval. All but one of the firms developing new drugs are small biotechs with little cash on hand to survive the time it will take to get there.

“We don’t have the variety of antibiotics we need, we don’t have the novelty of mechanisms we need, we don’t have enough addressing the World Health Organization’s priority pathogens,” Talkington says.

No one is arguing that antibiotics should be withheld from patients who need them. (Though dialing down outside-hospital use by the worried well who are using them as a preventative would be a good thing.) The problem instead is how to strengthen drug development so that new antibiotics are available if increased use pushes resistance to new heights. That’s proved a challenge so far.

In addition to its sky-high annual death toll, antibiotic resistance incurs enormous costs: The CDC estimated in 2013 that resistant bacteria require the US alone to spend \$20 billion extra on healthcare each year. Yet the problem hasn’t sparked the public policy response that the new coronavirus has. In fact, one bipartisan proposal to get a small amount of additional funding to drugmakers, by increasing the Medicare reimbursement rates of hospital antibiotic purchases, was taken out of the first pandemic stimulus bill.

Just last year, two promising antibiotic companies, Melinta Therapeutics and Achaogen, entered bankruptcy despite having gotten their drugs through the FDA. Since 2000, most of the big legacy drug firms that once made antibiotics have stopped. If coronavirus care makes resistance worse, taking more antibiotics out of circulation, that could encourage the few remaining firms to leave.

The vast international mobilization to do something about the new coronavirus—identify existing drugs, work up new treatments, achieve a vaccine—might paradoxically offer hope for antibiotic research. The enormous amount of work being launched shows that money and purpose can be marshalled against a threat, if the threat seems dire enough. In 2014, a UK government report predicted that deaths from antibiotic resistance could reach 10 million per year worldwide by 2050. That certainly seems dire.

“I’m hoping that once we get out of this, we’ll have a new appreciation of how vulnerable we are to infections, whether that’s new viruses or bacterial infections or resistant fungi on a cancer ward,” says Gerry Wright,

Bulletin Board

Gossip

MAY. 08, 2020

a microbiologist and drug discoverer, and director of the Michael G. DeGroot Institute for Infectious Disease Research at McMaster University, "and that we really need to invest in new drugs and vaccines in advance, and that policy makers will hear that and take some action."

wired.com, 23 April 2020

<https://www.wired.com>

Molecules Identified That Reverse Cellular Aging Process

2020-04-26

Central to a lot of scientific research into aging are tiny caps on the ends of our chromosomes called telomeres. These protective sequences of DNA grow a little shorter each time a cell divides, but by intervening in this process, researchers hope to one day regulate the process of aging and the ill health effects it can bring. A Harvard team is now offering an exciting pathway forward, discovering a set of small molecules capable of restoring telomere length in mice.

Telomeres can be thought of like the plastic tips on the end of our shoelaces, preventing the fraying of the DNA code of the genome and playing an important part in a healthy aging process. But each time a cell divides, they grow a little shorter. This sequence repeats over and over until the cell can no longer divide and dies.

This process is linked to aging and disease, including a rare genetic disease called dyskeratosis congenita (DC). This is caused by the premature aging of cells and is where the Harvard University team focused its attention, hoping to offer alternatives to the current treatment that involves high-risk bone marrow transplants and which offers limited benefits.

One of the ways dyskeratosis congenita comes about is through genetic mutations that disrupt an enzyme called telomerase, which is key to maintaining the structural integrity of the telomere caps. For this reason, researchers have been working to target telomerase for decades, in hopes of finding ways to slow or even reverse the effects of aging and diseases like dyskeratosis congenita.

"Once human telomerase was identified, there were lots of biotech startups, lots of investment," says Boston Children's Hospital's Suneet Agarwal, senior investigator on the new study. "But it didn't pan out. There are no drugs on the market, and companies have come and gone."

A Harvard team is now offering an exciting pathway forward, discovering a set of small molecules capable of restoring telomere length in mice.

Bulletin Board

Gossip

MAY. 08, 2020

Agarwal has been studying the biology of telomerase for the past decade, and back in 2015 he and his team discovered a gene called PARN that plays a role in the action of the telomerase enzyme. This gene normally processes and stabilizes an important component of telomerase called TERC, but when it mutates, it results in less of the enzyme being produced and, in turn, the telomeres becoming shortened prematurely.

For the new study, Harvard researchers screened more than 100,000 known chemicals in search of compounds that could preserve healthy function of PARN. This led them to small handful that seemed capable of doing so by inhibiting an enzyme called PAPD5, which serves to unravel PARN and destabilize TERC.

“We thought if we targeted PAPD5, we could protect TERC and restore the proper balance of telomerase,” says Harvard Medical School’s Neha Nagpal, first author on the new paper.

These chemicals were tested on stem cells in the lab, made from the cells of patients with dyskeratosis congenita. These compounds boosted TERC levels in those stem cells and restored telomeres to their normal length. However, rather than a scattergun approach, the team really wanted to test for safety and see if the treatment could precisely target stem cells carrying the right ingredients for telomerase formation.

More specifically, the team wanted to see if this could be achieved by having the PAPD5-inhibiting drugs recognize and respond to another important component of telomerase, a molecule called TERT. To do so, in the next round of experiments the team used human blood stem cells and triggered mutations in the PARN gene that give rise to dyskeratosis congenita. These were then implanted into mice that were treated with the compounds, with the team finding the treatment boosted TERC, restored telomere length in the stem cells and had no ill effects on the rodents.

“This provided the hope that this could become a clinical treatment,” says Nagpal.

The team will now continue its work in an effort to prove these small molecules are a safe and effective way to apply the brakes to dyskeratosis congenita, other diseases, and possibly aging more broadly.

“We envision these to be a new class of oral medicines that target stem cells throughout the body,” Agarwal says. “We expect restoring telomeres

Bulletin Board

Gossip

MAY. 08, 2020

in stem cells will increase tissue regenerative capacity in the blood, lungs, and other organs affected in DC and other diseases.”

The research was published in the journal *Cell Stem Cell*.

newatlas.com, 26 April 2020

<https://www.newatlas.com>

Bulletin Board

Curiosities

MAY. 08, 2020

Gardening is important, but seed saving is crucial

2020-04-21

The U.S. is in the midst of a gardening renaissance. As the coronavirus pandemic prompts big questions about the future of our food system, people everywhere are buying up seeds, pulling up lawns, building raised beds, and flocking to learn from Master Gardeners.

Most of these new and seasoned gardeners are making careful decisions about what type of plants they want to grow and how to organize the beds, but it's also a good time to consider another, perhaps more important aspect of food sovereignty: what kind of *seeds* you're planting and whether or not you'll be able to save and share them next year.

To save seeds is to preserve food culture. Heirloom crops wouldn't exist if it weren't for the gardeners who meticulously grew and saved seeds including the Brandywine tomato, Purple Top White Globe turnip, and many other varieties, passing them on to future generations.

In recent years, many Indigenous groups have also used seed saving as a way to preserve their cultures—as well as important crops like Cherokee White Eagle Corn, the Trail of Tears Bean, and Candy Roaster Squash for future generations.

Perhaps most important in this moment, saving (and sharing) seeds also makes sense economically. "People are having a hard time right now financially," says Philip Kauth, director of preservation for Seed Savers Exchange. But saving seeds is free and many seed libraries, seed exchanges, and other groups offer packets of seeds at prices that are lower than those offered by retail seed companies. "There are so many economical aspects to it. You don't have to buy seeds every year and you don't have to buy produce, depending on the time of the year."

"In the 1930s and 40s, it was popular for home gardeners to save their own seeds," says Fern Marshall Bradley, author of *Saving Vegetable Seeds* and an editor at Chelsea Green Publishing. The practice died out but is being revived again by gardeners who want more control (and creativity) with their crops. And it's easier than it seems to get started. If you're growing beans, tomatoes, squash, or similar plants you're already growing seeds. "Why not just take the extra step of saving them?" Bradley says.

Why Avoid Patented Seeds?

Seeds are either open-pollinated or hybrids. The latter are often bred for specific traits like drought resistance or large yields, but you can't save the

To save seeds is to preserve food culture.

Bulletin Board

Curiosities

MAY. 08, 2020

seeds. Unlike open-pollinated seeds which can be collected and replanted year after year to get the same tomatoes or lettuce as the year before, hybrids are patented and have been bred to grow just once. Technically, you can save the seeds, but they won't don't grow true to type, meaning you're likely a plant that produces very different food the second time around (if the seeds grow at all).

Beginning with the 1970 Plant Variety Protection Act (PVPA), which granted companies a certificate ownership of seeds, and the 1980 Supreme Court case *Diamond v. Chakrabarty*, which allowed seeds full patent protection, seed ownership began to look more like intellectual property law. In many cases, farmers were no longer allowed to save seeds and breeders couldn't use patented seeds to breed new plant varieties either. Today, the bulk of seed breeding has moved from public universities to private laboratories and four companies control more than 60 percent of global seed sales.

"Farmers no longer buy seeds," says Jack Kloppenburg, a sociologist and author of *First the Seed*. "They rent that seed from Monsanto or Syngenta," he explains referring to the trend that has overtaken many commodity crops like corn, soy, or cotton. Rather than growing a number of open-pollinated seeds that are bred to thrive in a particular climate or soil conditions, farmers throughout the world are turning to a few conglomerates to buy the same seeds and grow the same cash crops as the rest of the world.

"When there are only two places you can go for your seed as a farmer," Kloppenburg says, "you've got problems." He worries that if current trends continue, even more seeds will wind up under patent.

On the other end of the spectrum, a small group of seed breeders are working to expand the number of plant varieties that can be freely saved and shared. The Open Source Seed Initiative (OSSI) asks plant breeders working with open-pollinated varieties to pledge not to restrict others' use of the seeds they breed (or their derivatives) by patents or legal restrictions.

Seed companies can still sell the seeds (and the OSSI site includes a long list of open source varieties with links to the companies that sell them) researchers can still use the genetic material to create new varieties; they just can't restrict other companies and researchers from doing the same. The renewed popularity of open source seeds, independent seed companies, seed libraries, and other exchanges means that it's getting easier to find seeds adapted for local conditions. But you still won't find

Bulletin Board

Curiosities

MAY. 08, 2020

them in the plant section of Home Depot—or most other mainstream plant stores.

“If we have hyper-consolidation of all these [agricultural] industries and our farms are getting bigger and seed companies are getting bigger, I think people have less control over their food system,” says Claire Luby, co-founder of OSSI. “People are starting to recognize the role seeds play in food sovereignty, but it’s been slower than the local food movement.” Having seeds adapted for a local environment is particularly important in an era of climate change. That doesn’t happen if one [laboratory] is breeding “carrots for the entire country” as Luby says.

“It’s a fun thing to see people breeding [plants] for their community in the mountains or the high desert or really high conditions,” she says. “Sure, this tomato won’t be grown everywhere but that’s not the point. It does well in that one place.”

However, “you don’t need the breeder’s long-term view” to be good at seed saving, Bradley says. Even if someone isn’t trying to become a plant breeder, by saving seeds from plants that have survived (and thrived) enough at the end of the season to produce seeds, there’s already some selection taking place. “If you keep saving seeds from healthy plants, each year those seeds will give you plants that are better adapted to your conditions,” she says.

A Farmer’s Perspective

Even if they don’t want to counter-balance the global seed giants, some farmers have practical reasons to work with open-pollinated varieties and save their own seed. Kristyn Leach is the owner of the two-acre Namu Farm in Winters, California, which supplies produce to restaurant group Namu Gaji as well as other local establishments. When Leach started her farm in 2011, she quickly realized that most commercially available seeds didn’t work for the kind of farm she wanted to run.

“My aim has always been focused on no-till and minimum inputs,” Leach says, referring to her approach to using fertilizer, pesticides, and even water. Seeds might be labeled “high yield,” but farmers will only see those yields if the use of heavy irrigation which, in California, is particularly expensive for farmers and the environment.

Leach had previous experience breeding plants while working for a tomato breeder and decided to put those skills to use saving seed and selecting for crops that are optimal for her farm’s conditions. She set aside

Bulletin Board

Curiosities

MAY. 08, 2020

a few rows on her farm for breeding, stressing the plants by giving them less fertilizer or water and seeing which ones stayed alive.

“Basically you’re attempting to kill a percentage of your plants in the hopes that what remains has the genetics to withstand [those conditions],” she explains.

Plant breeding and seed saving are not common practices among farmers, who look at the economics of buying a seeds versus the land and time needed to grow extra plants to save their own. “Seed is not an expensive line-item but fertility and water are,” Leach explains. “It saves money downstream.” One project she undertook with eggplant took six years to complete. But at the end of that time, Leach went from needing to water the crop three hours every other day to one and a half hours every week.

The Seed Savers Exchange website suggests people pay attention to how often a given crop sets seed (in other words, whether a plant is biennial, annual, or perennial), plot the garden to avoid unwanted cross-pollination from similar plants, and that gardeners grow enough to be able to both harvest plants for food and save seed as well as getting more genetic diversity into the saved seeds.

Kauth recommends people start with a beefsteak tomatoes or beans because the seeds are large and the plants are familiar to most gardeners. Lettuce and other greens can be easy to save seed from too since the plants grow so quickly. There are numerous books on seed saving (*Seed to Seed* by Suzanne Ashworth is one well-regarded title recommended by Luby) as well as online resources for anyone who wants to get started.

The hope is that as more seeds go open-source it will help lead to a boom in the biodiversity of seeds again and leave future generations with more varieties of plants and food to enjoy (and seeds to save). Seed Savers Exchange sells some open-source seeds in addition to rare and heirloom varieties, houses the largest nongovernmental seed bank in the U.S., and even hosts an in-person seed exchange where people can swap seeds with strangers from all over. (There’s an online seed saving and seed swapping exchange as well.)

“We want people to save the seeds they get from us,” Kauth says. “If you buy seeds a couple times in your gardening life from us, that’s perfectly fine. Save those seeds and share them with friends and family next year.” At a time when seeds are hard to come by and communal anything feels more vital than ever, seed saving seems to transcend the many political and practical motivations behind it.

Bulletin Board

Curiosities

MAY. 08, 2020

Coronavirus may not impact spring seed orders in 2021, but there are plenty of other potential interruptions to seed supply from a bad harvest to a storm. "Saving seed guarantees you've got them and it can be fun to trade them with other people," says Bradley.

She believes that gardening with seed saving in mind can also make you a better grower. You need healthy plants at the end of the season which means you might pay more attention to how their plants are growing. A packet of seeds might seem relatively inexpensive but the feeling of saving more than enough for next year's harvest from a single tomato is priceless.

civileats.com, 21 April 2020

<https://www.civileats.com>

Where Have All The Insects Gone?

2020-04-23

HE BUTTERFLIES JUST kept coming—at first thousands, then tens or even hundreds of thousands. Their wings were brown on the underside and vivid orange above, so as they flew by, they looked like chips of sunshine. The sight was marvelous, awe-inspiring, and more than a little disconcerting.

I encountered the butterfly cloud—technically, an irruption of California tortoiseshells—on a bright blue summer day in the Sierra Nevada. Along with Matt Forister, a biologist from the University of Nevada, Reno, I was hiking Castle Peak, a knob-shaped mountain northwest of Lake Tahoe. Castle Peak's butterflies are one of the world's most closely watched insect populations: Every summer for nearly 45 years they've been censused on a biweekly basis. Most of the data were collected by Forister's mentor, Art Shapiro, a passionate lepidopterist and professor at the University of California, Davis, who recorded the information on three-by-five cards.

After Forister and his team computerized the surveys and analyzed them, they found that Castle Peak's butterflies have been in decline since 2011. We were discussing why this was the case when we neared the 9,100-foot summit and were enveloped in an orange haze.

"The idea that insects are suffering seems shocking to people, which I understand," Forister said. He gestured at the butterflies streaming by: "Insects do this, so it does seem weird."

At any given moment, it's been estimated, there are 10 quintillion insects flying, crawling, hovering, marching, burrowing, and swimming around.

Bulletin Board

Curiosities

MAY. 08, 2020

It's said that we live in the Anthropocene—an epoch defined by human impacts on the planet. Still, by many measures, it's bugs that dominate the world. At any given moment, it's been estimated, there are 10 quintillion insects flying, crawling, hovering, marching, burrowing, and swimming around. In terms of variety, the numbers are equally impressive: Something like 80 percent of all the different kinds of animals are insects. They maintain the world as we know it: Without insects to pollinate them, most flowering plants, from daisies to dogwoods, would die out.

If humans were to suddenly disappear, biologist Edward O. Wilson has famously observed, the Earth would “regenerate back to the rich state of equilibrium that existed 10,000 years ago.” But “if insects were to vanish, the environment would collapse into chaos.”

It is, therefore, shocking—and alarming—that in most places scientists have looked recently, they've found that insect numbers are falling. This is the case in agricultural areas and in wild places like Castle Peak. Quite probably, it's also happening in your own backyard.

The Entomological Society of Krefeld, Germany, on the Rhine River not far from the Dutch border, stores its collections in a former schoolhouse. Where kids used to fidget through class, the rooms now hold boxes filled with bottles, and the bottles, in turn, are filled with clumps of dead insects floating in ethanol. If there were a ground zero for the exploding concern about insect decline, the schoolhouse would be it.

“We don't count the bottles, because the number changes every week,” Martin Sorg, the head curator of the collection, told me. He estimates that there are “several tens of thousands.”

In the late 1980s Sorg and his colleagues set out to find how insects were faring in different types of protected areas in Germany. To get a handle on this, they set up what are known as malaise traps, which look like tilted pup tents. The traps caught everything that flew into them, including flies, wasps, moths, bees, butterflies, and lacewings. Whatever a trap caught ended up in a bottle.

The collecting went on for more than 20 years, first in one spot, then another, in 63 protected areas, mostly in the state of North Rhine-Westphalia, where Krefeld is located. In 2013 the entomologists returned to two sites that they'd first sampled back in 1989. The mass of trapped insects was just a fraction of what it had been 24 years earlier. They sampled those sites again in 2014 and set about resampling more than a dozen other sites. Wherever they collected, the results were similar.

Bulletin Board

Curiosities

MAY. 08, 2020

To interpret the results, the society enlisted the help of other entomologists and statisticians, who painstakingly sifted through the data. Their analysis confirmed that from 1989 to 2016, flying insect biomass in protected areas in Germany had declined by a whopping 76 percent.

This finding, published in the scientific journal *PLOS One*, made headlines around the world. The *Guardian* warned of “ecological Armageddon,” the *New York Times* of “insect Armageddon.” The *Frankfurter Allgemeine Zeitung* declared that “we find ourselves in the middle of a nightmare.” According to the website Altmetric, which tracks how often published research is mentioned online, the study was the sixth most discussed scientific paper of 2017. The once obscure Krefeld Entomological Society was deluged with scientific and media requests, and it remains so to this day. “There simply is no end,” Sorg said, sighing.

Since the Krefeld paper, entomologists all over the world have been poring over records and collections. Some scientists argue there’s a bias in the published papers; they say a study that shows dramatic changes is more likely to be printed than one that doesn’t. Still, the results have been sobering. Researchers working in a protected forest in New Hampshire found that the number of beetles there had fallen by more than 80 percent since the mid-1970s, while the bugs’ diversity—the number of different kinds—had dropped by nearly 40 percent.

A study of butterflies in the Netherlands found their numbers had declined by almost 85 percent since the end of the 19th century, while a study of mayflies in the upper Midwestern U.S. found their populations had dropped by more than half just since 2012. In Germany a second team of researchers confirmed the gist of the Krefeld results. They found that from 2008 to 2017, the number of insect species in the country’s grasslands and forests—sampled repeatedly in hundreds of sites in three widely spaced protected areas—had fallen by more than 30 percent.

“It is frightening,” said one of the researchers, Wolfgang Weisser, a professor at the Technical University of Munich. But it “fits the picture presented in a growing number of studies.”

People may delight in butterflies and detest mosquitoes, but most insects we simply ignore. This says way more about creatures with two legs than it does about creatures with six.

Insects are far and away the most diverse creatures on the planet, so much so that scientists are still struggling to figure out how many different kinds there are. About a million insect species have been named, but it’s

Bulletin Board

Curiosities

MAY. 08, 2020

generally agreed that many more—by recent estimates some four million more—have yet to be discovered. Just one family of parasitoid wasps, the Ichneumonidae, sometimes called Darwin wasps, contains something like 100,000 species, greater than the number of all known species of fish, reptiles, mammals, amphibians, and birds combined. (The mere existence of the Ichneumonidae, Charles Darwin once argued to a friend, was enough to disprove the biblical theory of creation, as no “beneficent and omnipotent God” would have designed such a ghoulish, murderous parasite.) Other insect families are similarly big; there are, for example, perhaps 60,000 species of Curculionidae, commonly known as weevils.

In keeping with their extraordinary variety, insects are found in virtually every type of terrestrial habitat, including the most extreme. Stone flies have been recorded in the Himalaya at elevations above 18,000 feet, and silverfish in caves 3,000 feet below Earth’s surface. The Yellowstone hot springs alkali fly lives at the edges of scalding pools, while the wingless midge *Belgica antarctica* survives the cold by coating its eggs in a kind of antifreeze gel. A fly known as the sleeping chironomid, native to semiarid regions in Africa, has larvae that shrink to desiccated flakes in very dry times, entering a kind of suspended animation from which they have been observed to recover after more than 15 years.

What accounts for the tremendous variety of insects? Many explanations have been offered, the simplest being that insects are old. Very old. They were among the earliest animals to colonize land, more than 400 million years ago—nearly 200 million years before the first dinosaurs appeared. Such an extended history has allowed insect diversity to build up over time.

But having the ability to occupy many different environmental niches probably also mattered. Insects are so small that a single tree can be home to hundreds of kinds, some boring into the bark, others tunneling into the leaves, still others feeding on the roots. This sort of “resource partitioning,” as ecologists call it, allows many species of insects to inhabit more or less the same space.

Then there’s the fact that insects, historically at least, have had low extinction rates. A few years ago researchers examined the fossil record of the largest suborder of beetles, Polyphaga, a group that includes scarabs, click beetles, and fireflies. They found that not a single family in the group had gone extinct in its entire evolutionary history, even during the mass extinction at the end of the Cretaceous period, 66 million years ago. The finding makes recent declines seem all the more ominous.

Bulletin Board

Curiosities

MAY. 08, 2020

Every autumn thousands of researchers gather for the annual meeting of the Entomological Society of America. Last fall the meeting was held in St. Louis, and the best attended session was titled “Insect Decline in the Anthropocene.”

Speaker after speaker rose to present the doleful evidence. Sorg discussed the work of the Krefeld group, Forister the drop in butterflies in the Sierras. Toke Thomas Høye, a researcher at Denmark’s Aarhus University, chronicled a decline in the number of flies visiting flowers in northeast Greenland, and May Berenbaum, an entomologist at the University of Illinois, spoke about the “global pollinator crisis.”

David Wagner, an entomologist at the University of Connecticut, had organized the session. When it was his turn at the mic, he pointed to a “conundrum.” The speakers, he noted, had all pretty much agreed insects were in trouble, but when it came to a cause, there was no consensus. Some blamed climate change, others farming practices or other infringements on insect habitat. “It’s pretty phenomenal that we have so many scientists looking at this problem and yet are not exactly certain what the stressors are,” he observed.

A few weeks after the session I met Wagner at the American Museum of Natural History in New York. The museum holds one of the world’s most extensive insect collections—row after row of metal cabinets filled with millions of pinned specimens. More or less at random, Wagner unlocked a *Bombus*—or bumblebee—cabinet. In one drawer were Patagonian bumblebees, *Bombus dahlbomii*. Among the largest bees on the planet, they used to be common across much of Chile and Argentina. In recent years their populations have crashed.

Another drawer was filled with rusty patched bumblebees—*Bombus affinis*—which are distinguished by a reddish patch on their backs. Native to the Midwest and northeastern United States, they too used to be common, but their numbers have fallen so low that they’re now listed as an endangered species.

“You just can’t find them anymore,” Wagner said. He explained that there’s another species, the gypsy cuckoo bumblebee, that lives by invading the nests of other bumblebees, including the rusty patched, eating their larvae and replacing them with its own. “That bee has also been disappearing,” he said.

I asked Wagner what he thought was driving insect declines. On some level, he said, the answer was obvious: “We’d expect things to be declining

Bulletin Board

Curiosities

MAY. 08, 2020

with seven billion people on the planet.” In the process of feeding, clothing, housing, and transporting themselves, people are altering the planet in fundamental ways—mowing down forests, plowing up grasslands, planting monocultures, pouring pollutants into the air. Every one of these is a stressor for insects and other animals. Populations of just about all animal groups are dropping.

“We know we are in a biodiversity crisis,” Wagner said.

What is confounding is the rate of insect loss reported in recent studies. Results like those out of Krefeld suggest that insects are declining significantly faster than other animal groups. Why? Pesticides are one possibility; though aimed at “pest” species, the chemicals don’t discriminate between insects that damage crops and those that pollinate them. (Even protected areas in Germany may be affected by pesticides, since many of those areas abut agricultural land.) But in some places where steep declines have been reported—the White Mountains of New Hampshire, for example—pesticide use is minimal. Hence the conundrum.

“The issue right now is to figure out to what degree insects are more imperiled than other species,” Wagner said. “It’s urgent.”

“For the first time,” he added, “I think people are really worried about ecosystem services and all the things insects do to sustain the planet.”

In their nearly infinite variety, insects perform myriad labors, many of them unsung. Roughly three-quarters of all flowering plants rely on insect pollinators—bees and bumblebees most familiarly, but also butterflies, wasps, and beetles. Most fruit crops, from apples to watermelons, need insect pollinators.

Insects are also critical seed dispersers. Many plants equip their seeds with little appendages, known as elaiosomes, that are packed with fats and other goodies. Ants carry off the seed, eat only the elaiosome, and leave the rest to sprout.

Insects, in turn, provide food for freshwater fish and just about every kind of land animal. Insectivorous reptiles include geckos, anoles, and skinks; tree shrews and anteaters are insectivorous mammals. Birds that subsist mainly on bugs include swallows, warblers, woodpeckers, and wrens.

Even birds that are omnivores as adults often rely on insects when they’re young. Carolina chickadees, for example, rear their chicks exclusively on caterpillars. (It takes more than 5,000 caterpillars to fledge a nestful.) A recent study of North American birds found that their numbers also have

Bulletin Board

Curiosities

MAY. 08, 2020

been in steep decline—down by almost a third since 1970. Species with insect-heavy diets have been among the most hard-hit.

Insects are also crucial decomposers that keep the wheel of life turning. By eating poop, dung beetles help return nutrients to the soil. Termites do the same by consuming wood. Without insects, dead organic matter—including human bodies—would begin to pile up. Under the right conditions, blowfly maggots can consume 60 percent of a human corpse within a week.

It's hard to assign a dollar value to all this work, but back in 2006 a pair of entomologists tried. They looked at four categories of "insect services"—"dung burial, pest control, pollination, and wildlife nutrition"—and came up with a figure of \$57 billion a year for the U.S. alone.

La Selva Research Station is just 35 miles north of Costa Rica's capital city, San José, but getting to it entails a two-hour drive over a steep mountain pass with hairpin turns.

One of La Selva's nightspots used to be a small pavilion equipped with a white sheet and a black light left on to attract insects. So many insects would collect on the sheet that visitors to the station would stay up until dawn to watch them. Over the past two decades, though, the display has become less spectacular, to the point where it's no longer really a display at all. Two trips to the pavilion on steamy nights this past January yielded the following tally: three moths, one weevil, a shield bug, and some gnats.

"When I first came here, this really was a hangout point," Lee Dyer, an ecologist from the University of Nevada, Reno, said of the pavilion. "Now you don't ever see any insects—maybe one or two."

Dyer has been working at La Selva since 1991. His research focuses on the interaction between insects and their host plants, and insects and each other. Many insects live off other insects. Most parasitic wasps, for example, lay their eggs in the bodies of caterpillars, using their hosts as a kind of living pantry: The wasp larvae gradually eat the caterpillars from the inside out. Other insects, known as hyperparasitoids, lay their eggs in or on the bodies of parasitoids. There are even insects that parasitize hyperparasitoids.

With the help of students and volunteers, Dyer has been collecting caterpillars at La Selva and rearing them to see what emerges—moths in some cases, parasitoids in others. Like the members of the Krefeld Entomological Society, he didn't set out to find evidence of insect decline.

Bulletin Board

Curiosities

MAY. 08, 2020

But it found him. One of his graduate students, Danielle Salcido, recently sifted through the two decades' worth of data. She found that since 1997, caterpillar diversity at La Selva has dropped by almost 40 percent. Parasitoid diversity has dropped by even more—around 55 percent.

Parasitoids help keep many crop-eating caterpillars in check, so if they're declining, agricultural losses may increase. (Salcido found that a couple of groups of caterpillars that are prone to outbreaks were increasing, even as most caterpillars were declining.) The loss of interactions between caterpillars and parasitoids also means entire food chains may be unraveling, in many cases before humans have had a chance to discover them.

"I was an English major," Dyer said. "And these kinds of interactions, these stories, are like poems." When so many are lost, "it's like burning down a library."

Most long-term data about insects come from the temperate zone—Europe or the U.S. But something like 80 percent of all insect species live in the tropics, which is what makes Dyer and Salcido's findings potentially so significant. Though La Selva is surrounded by agriculture, which brings problems like habitat fragmentation and pesticide use, Dyer believes one of the main drivers of the decline is climate change. In particular he points to the increase in extreme weather events, like floods. Many insect species "are really susceptible, in the tropics especially, to extreme weather conditions," he said. "They're just not adapted to big fluctuations."

Dan Janzen and Winnie Hallwachs are tropical ecologists at the University of Pennsylvania. They spend part of the year in Philadelphia and part north of the city of Liberia, in western Costa Rica, in a house they share with whatever wildlife settles in, including whip scorpions and nectar bats. When a visitor arrived from La Selva, Hallwachs pointed out a three-inch-long cockroach under the sink. "I tell people, books are nothing but termite food," Janzen said, gesturing toward a small mound of shredded paper in one of the bookcases.

The surrounding landscape is very different from La Selva—tropical dry forest and, up the mountain, cloud forest instead of lowland rainforest. But here too, Janzen and Hallwachs have seen a dramatic decline in insects. Hallwachs recalled that in the mid-1980s, when they got an early personal computer, the light from the screen at night attracted so many bugs they had to erect a tent in the house and work inside it.

Bulletin Board

Curiosities

MAY. 08, 2020

"I'm now at a point where every insect that crosses my desk at night goes into a little plastic tube with alcohol," Janzen said. He'd been back in Costa Rica for two weeks and had collected only nine insects.

Janzen and Hallwachs also attribute much of the decline to climate change. Janzen, who's 81, said that when he first started coming to Costa Rica in 1963, the dry season lasted four months. "Today we have a six-month dry season, so all those things that had their lives organized around a four-month dry season are now hit with two extra months. They run out of food, they run out of cues, everything just falls apart."

What can be done to reverse these ominous trends? On some level, of course, that depends on what's driving them. If it's primarily climate change, then it would seem that only global action to reduce emissions could really make a difference. If pesticides or habitat loss are the main culprits, then action on a regional or local scale could have a big impact.

In an effort to protect pollinators, the European Union has banned most neonicotinoid pesticides, which several studies have linked to insect and bird declines. Last fall the German government adopted an "action program for insect protection," which calls for restoring insect habitat, banning the use of insecticides in certain areas, and phasing out glyphosate, a commonly used herbicide. (Glyphosate may be eliminating key plants that insects depend on, and research suggests it also could be disrupting their immune systems.) "We cannot do without insects," the action plan noted.

Recently a group of more than 50 scientists from around the world proposed a "roadmap" for insect conservation. It recommended "taking aggressive steps to reduce greenhouse gas emissions," preserving more natural areas as safe havens for insects, and imposing stricter controls on exotic species. (The collapse of the Patagonian bumblebee, in South America, and possibly of the rusty patched bumblebee, in North America, was caused by bees introduced from Europe.) The group also called for reducing the application of synthetic pesticides and fertilizers.

"There are a lot of things we could do, regardless of how this play ends, that would be good practices," said Wagner, who was part of the group. "Anything to do with climate would be number one on my list. If we could roll back pesticide use for cosmetic purposes, like on our lawns, that's a win-win for the planet."

One of the few organizations in the world specifically devoted to invertebrate conservation is the Xerces Society, based in Portland,

Bulletin Board

Curiosities

MAY. 08, 2020

Oregon. (The society was named after the Xerces blue, a butterfly native to the San Francisco peninsula that went extinct in the 1940s because of development.) One day not long after I climbed Castle Peak, I went with the society's director, Scott Black, to visit some of its collaborative projects in California's Central Valley. As he drove, Black recalled one of his first loves, a Mustang he'd bought as a teenager in Nebraska in 1979. He constantly had to wash it because it was plastered with dead bugs. Now, he said, he rarely has to scrape dead insects off his car. This phenomenon has been so widely noted it's become known as the "windshield effect."

Mile after mile of precisely planted fields flew by. Black shook his head. It used to be that farms in the valley were rimmed with weedy patches where insects could take refuge; today, he said, they tend to be plowed from one roadway to the next. "What I see is a lack of habitat."

Eventually we reached Bixler Ranch, in the town of Stockton. The 1,300-acre spread grows almonds and blueberries, and a few years ago its owners decided to work with Xerces to plant hedgerows and add back some of the native habitat that had been lost over a half century of increasingly intensive agriculture. One hedgerow had been planted in an old irrigation ditch and extended for more than half a mile. Taller shrubs like Woods' rose and elderberry alternated with smaller ones like white sage and western vervain. It was a hot, dusty day toward the end of summer, and most of the plants were looking thirsty. Even so, they were buzzing with leaf-cutter bees and sweat bees. "We have lots of data that show if you do this, they will come," Black said.

"Plants and insects are the fabric of this planet," he went on. "We're ripping it to shreds, and we need to knit it back together."

[nationalgeographic.com](https://www.nationalgeographic.com), 23 April 2020

<https://www.nationalgeographic.com>

The Race To Design A Rain Jacket That Won't Kill The Planet

2020-04-22

OF THE HALF-DOZEN coats hanging in my closet, all but one are made for trudging around in the outdoors. Each of these jackets has an invisible coating of poly- and perfluoroalkyl substances that makes them waterproof. If your closet is similar, your jackets have similar coatings, as the outdoor apparel industry has relied on these chemicals for decades.

The value of water-proof coatings made with fluorinated chemicals was hard to dispute.

Bulletin Board

Curiosities

MAY. 08, 2020

While a jacket that keeps you dry during a rainy hike is of course desirable, PFASs have a big problem. The highly fluorinated chemicals find their way into the ecosystem through manufacturing waste. Studies have [linked](#) exposure to PFASs in manufacturing runoff to liver and immune system damage, neurological damage, and some cancers, among other ailments.¹

Manufacturers that make goods like furniture, carpets, and cookware have found ways to stop using PFASs, but the outdoor apparel industry has been slower to change. Recently, several big brands have made [significant progress](#) in developing alternatives, switching to less harmful coatings or processes in some of their waterproof pieces. But these alternatives often aren't as comfortable or as water-resistant as chemically treated pieces. At outdoorwear's high end, where consumers expect comfort and performance to excel, such limitations have impeded progress.

"Despite being outspoken environmental advocates, most outdoor brands have not yet managed to remove PFASs from rainwear, due to concerns with performance," says Arlene Blum, executive director of the Green Science Policy Institute, which tracks [brands that use PFAS-free materials](#). "Compare this to the carpet industry that got rid of harmful PFASs within a couple years."

Some positive changes are apparent. Many brands have invested multiple years and millions of dollars into solutions that lighten the environmental impact of manufacturing waterproof outerwear. The North Face developed a new woven material called Futurelight that it puts in some [high-end jackets](#), and Norwegian apparel maker Helly Hansen is putting a new, PFAS-free waterproof fabric called [Lifa Infinity Pro](#) into select jackets this fall. But these are just a couple of examples. Most industry players are still struggling to make high-end jackets and shells that perform as well—and are as comfortable to wear—as the stuff treated with PFASs.

An accomplished mountaineer herself, Blum led the first American ascent of Annapurna I in Nepal, one of the world's most dangerous mountains to climb, and was among the leaders of the first women's team to climb Denali, in Alaska. Blum understands as well as anyone the importance of a weatherproof jacket. Simultaneously, she's committed her career to fighting the harmful chemicals used to manufacture most of them.

"For many products that are used indoors, learning about the health and environmental harm helped change everything fairly quickly," Blum says. "Five years ago, furniture and carpet makers took action once they learned that they damage your health and cause cancer, but because there wasn't

Bulletin Board

Curiosities

MAY. 08, 2020

a great alternative for durable water repellents, outdoor companies were slow to act.”

The value of waterproof coatings made with fluorinated chemicals was hard to dispute. Until recently, jackets made with other coatings were stiff, brittle, and not waterproof. Durable water repellents, or DWRs, have been used for decades to help moisture bead up and roll off a fabric. Only repellents made with PFASs would prevent soaking, which makes the wearer becoming cold and wet to a degree that’s life-threatening in extreme conditions.

Five years ago, Blum and her colleagues published [the Madrid Statement](#), a document that outlines the scientific research around the harm PFASs cause to the environment. The statement concluded that governments, organizations, and manufacturers needed to take rapid steps to reduce the use of these chemicals. Widely circulated, her work encouraged the EPA to set a [health advisory level](#) for PFASs, leading to the conclusion that the drinking water of 6 million Americans had become contaminated with PFASs.

Though the use of PFASs remain prevalent in the apparel industry, progress is being made to reel them back. Philip Tavell is an ex-professional skier and Outdoor Category Manager for Helly Hansen. He’s spent the last four years leading a small team to develop the new Lifa Infinity Pro fabric, which comes to market later this year.

“The material is kind of simple, at least in theory,” Tavell says. “Both the fabric and yarn are hydrophobic, meaning they won’t absorb water. We did this without any chemical treatment. The woven structure is designed to bead water, just like a coating. This provides a consistent, durable, and dry surface.”

Because chemicals wear down much faster than fibers, the jacket keeps its inherent waterproof properties longer than rain shells treated with PFASs. The downside is that the garment has almost no stretch, making it useful for resort skiing, sailing, and hiking, but less great for rock climbing, cross-country skiing, or activities that require more agility.

Collaborations are blooming between different companies in the industry. Tavell says Helly Hansen is considering open-sourcing the technology its developed. “A lot of people internally agree that we should,” he adds. “We already have had requests to license it.”

Bulletin Board

Curiosities

MAY. 08, 2020

Gore, the maker of Gore-Tex and a leading supplier of waterproof fabrics, is also working to eliminate PFASs of concern from its products. (Many PFASs are toxic, but others have toxicity levels so low that they are considered insignificant by researchers. It's the toxic PFASs "of concern" that Gore's efforts have been targeting.) In 2017, the company set internal goals for removing these PFASs from all consumer products. Despite early setbacks, it's aiming to be entirely free of toxic PFAS by the end of 2023.²

"We began exploring DWR alternatives in 2012, working with chemical suppliers from around the world," says Jon Hammerschmidt, who works on sustainable fabric initiatives for the company. "A few years ago we brought the project in-house, to develop our own PFAS-free coating and membrane technology."

Hammerschmidt respects the complexity of the problem, acknowledging that a waterproof jacket needs to simultaneously stretch, breathe, and keep water out. These qualities are often at odds with each other. Once this cocktail is mastered, the next hurdle is durability. Extending the life of a garment has a significant impact on its environmental footprint. Lastly, any potential solution needs to be able to be produced at scale, since Gore supplies materials to many apparel companies.

"When we released our first DWR free of PFASs of environmental concern in 2018, most brands were excited, but they needed time to confirm what it could and couldn't do," Hammerschmidt says. "Over half of our outdoor products today use this formula, but it doesn't replace all rain shells. That's the challenge we're trying to solve now." Gore is now partnering with teams outside the company, including academic researchers, crowdsourcing efforts, and partner companies.

One corporate partnership is with Mountain Hardwear. Steve Adams is a product manager there. "This spring, we moved 80 percent of our jackets to a PFAS-free DWR, after a year of field testing," Adams says. "The last challenge is the high-end performance stuff."

Another of Gore's partners, Norrona, has made similar progress; 72 percent of its DWR products are currently PFAS-free. "We've been working toward a goal of becoming completely free by the end of 2020, a target we set with Gore-Tex," says Brad Boren, Norrona's director of innovation and sustainability. "Unfortunately, neither of us are going to hit that milestone, primarily because certain performance fabrics just aren't there yet."

The research team at Norrona took a unique approach. It developed new fibers from renewable biomass resources like plant fibers that are softer

Bulletin Board

Curiosities

MAY. 08, 2020

and stronger than the fibers derived from fossil fuels, which make up most synthetics on the market today. Boren credits his team's progress to collaboration with other corporations and nonprofits.

"We've worked a lot with platforms like Fashion for Good, researchers at Gore-Tex, and a network of others to develop new chemistries that look promising," Boren says. "Many sustainability researchers in the outdoor industry are open, trading lessons and having conversations to help each other find solutions. Our collective goal is to develop a fabric that suits the hard users—workwear for the mountain."

Boren emphasizes that unless you test a material rigorously, you won't find the problems. Critical issues often appear after many months of use. Accordingly, most new Norrona materials are tested in the field for a full year.

Patagonia was similarly blunt about the issue. Acknowledging that the company has long relied on PFASs, it's been keyed into this issue for the better part of a decade. Patagonia first started researching the problem in 2012. Two years later, it tested a sample of PFAS-free DWR, which was less supple, tore easily, and soaked through much faster than DWR with fluorinated coatings.

"As a technical apparel company, over half our styles use a DWR of some kind, from down sweaters to alpine shells," says Matt Dwyer, Patagonia's senior director of materials innovation. "For critical applications, like a rain jacket you'd wear for 24 hours, we don't have a solution yet."

Patagonia is aiming to have 85 percent of its garments PFAS-free by the end of 2022. "The remaining 15 percent are the type of jackets you're wearing because you know you're going to get wet and require higher performance," Dwyer says. "We're working with chemists globally to crack the code on a PFAS-free DWR for these. While fluorinated coatings almost always work, these new chemistries are complex. It's like knocking down a building with a hammer and chisel when you're used to working with dynamite."

Like others, Dwyer noted that his team is actively collaborating with some of its biggest industry rivals to solve the problem of PFAS. "For many of us, this issue supersedes competition," he says. "We're all working in the same supply chain and trying to solve the same chemistry problem. We're in this together because it's more important than sales."

Bulletin Board

Curiosities

MAY. 08, 2020

1. Update, April 23 at 11 am: This story was updated to clarify that the manufacturing process of rain jackets is the biggest cause of concern for PFAS' impact on human health, not the erosion of PFAS polymers from a rain jacket that has been treated with them. 2. Update, April 23 at 8:30 pm: The story was updated to clarify that of several classes of PFASs, not all are considered toxic enough to cause environmental concern.

wired.com, 22 April 2020

<https://www.wired.com>

How To Protect Your Mental Health In The Time of Coronavirus

2020-04-22

AFTER weeks of complete social isolation, Italy has undergone what psychiatrist Paolo Brambilla calls "a social experiment that has never been done before". The country has suffered a massive death toll from the coronavirus, and has endured one of the strictest lockdowns in the world. The effects on the nation's psyche will be profound, says Brambilla, who is at the University of Milan. This month saw half of the world's population enter some form of confinement, and many people are facing the biggest threat to their health and livelihood in recent history.

"We are seeing the spread of a virus, but we have also, from the very beginning, been seeing the spread of fear as well," says Aiysha Malik, a psychologist at the World Health Organization. As well as having to wrap our heads around the threat of the virus itself, public and personal life has changed beyond recognition. The actions we have had to take to curb the spread of disease have left some of us struggling to cope with a lack of childcare while working, a loss of income, separation from family and friends, and serious health fears. For others, it has meant working on the front line, facing potentially traumatic experiences and making tough moral decisions. Whatever our situation, it's time to look at what we can all do to limit the toll on our mental well-being.

"People are facing a novel, threatening and unpredictable experience," says psychiatrist Andrea Danese at King's College London. "At the same time, people are losing important coping strategies for stressful situations, enduring disruption in their routine and having to distance themselves from friends and families. They may also suffer the losses of loved ones. It is important to consider the longer-term implications of this emergency for mental health." In a survey published last week in *The Lancet Psychiatry*,

As well as having to wrap our heads around the threat of the virus itself, public and personal life has changed beyond recognition.

Bulletin Board

Curiosities

MAY. 08, 2020

people in the UK reported increased anxiety, depression and stress, and concerns about social isolation. These were larger worries than the prospect of having covid-19.

Taking these psychological costs seriously is critical, says Sandro Galea, a physician and epidemiologist at Boston University in the US. "The mental health impact is the next wave of this event, and I am worried that we're not talking about it enough," he says. "These issues are very real." It isn't too soon to start to tackle the fallout, says Malik. "Countries need to prepare for how they're going to address mental health and psychosocial support, now."

How do we do that? In many respects, the situation is unprecedented, so we are dealing with the unknown. But there are ways to begin to make sense of things. Results are coming in from studies and reviews turned around at breakneck speed. We can also ground our thinking in previous research on the psychology of epidemics and quarantine, in the response to past events, including terrorist attacks and natural disasters, and in theories of trauma and resilience. We asked those working in mental health to share their understanding of the situation, and to offer their advice on how we can protect ourselves and our loved ones.

How we can all look after our mental health

Seven days after the UK went into lockdown, Richard Bentall, a clinical psychologist at the University of Sheffield, was in the middle of analysing the impact the week had had on the mental health of 2000 people in the UK. "I've never moved so fast on a piece of research – it's extraordinary really," he says. The people were representative of the nation's adult population in terms of age, sex and household income. Each participant completed a standard survey about their levels of depression, anxiety and symptoms of trauma related to covid-19, with different people answering on different days that week.

The results suggest that Prime Minister Boris Johnson's announcement of lockdown on 23 March correlated with a spike in depression and anxiety. Prior to the announcement, 16 per cent of participants reported depression, and this rose to 38 per cent immediately following it. For anxiety, the proportion rose from 17 to 36 per cent. Over the course of the week, however, the level settled at around 20 per cent for both. "The population as a whole is looking pretty resilient," says Bentall, although this could change as the spread of the virus progresses.

Bulletin Board

Curiosities

MAY. 08, 2020

The mental health impacts of the lockdown may vary by location. It will be different, for instance, for people living in large cities with no outside space and those in the countryside who have their own gardens, says Brambilla. This was borne out by Bentall's survey, which showed that urban living was associated with a higher risk of depression and anxiety. There are many ways that the psychological impact of social isolation can play out, says Brambilla, particularly in very social cultures. Stress-related symptoms might include sleep disorders and gastric troubles, he says. "And, of course, the general level of anxiety and depression might increase. At the most extreme levels, we might expect an increase in the rate of suicide." In Italy, at least two nurses treating covid-19 cases have died by suicide.

The way that lockdown is implemented by governments can affect outcomes, according to research by psychiatrist Neil Greenberg at King's College London and his colleagues. In late February, they published a rapid review of 24 papers on previous outbreaks including SARS, Ebola and the H1N1 swine flu, focusing on the mental health impact of quarantine. "If quarantine is done well, although it will be frustrating and a bit annoying at times, it needn't cause long-term mental health problems," says Greenberg. "But if it is done badly, it can have a profound effect on people's lives, for months and years ahead." While the paper was looking specifically at quarantine, which is different to lockdown or social isolation, "there are a lot of good lessons we can learn," says Greenberg.

"If done well, quarantine need not cause long-term mental health problems"

The effects of quarantine were found to include anxiety, low mood, depression and symptoms of post-traumatic stress. "We would hope that most people who develop mental health problems will recover after a period of months without the need for treatment," says Greenberg. "But there's no doubt that some people are going to need mental health care as a direct result of what is going on."

Several factors can make quarantine go well, psychologically speaking, according to the research. We need to understand the rationale and "buy into it". Many of the negative effects of quarantine are associated with our loss of liberty, whereas voluntary quarantine is much less problematic. So appealing to altruism by reminding people of the benefits to wider society can help. We also need access to basic supplies, we need to be able to communicate with others and have access to activities to keep us occupied, and we need to feel that we aren't going to be financially incapacitated. And the quarantine should be as short as possible and for

Bulletin Board

Curiosities

MAY. 08, 2020

a fixed time. "We found that extending the period of quarantine once it has already been set is particularly detrimental to mental health," says Greenberg.

Loneliness will play a part for many during this time, but not necessarily in the way we might assume, says Farhana Mann, a psychiatrist at University College London. It is important to understand the distinction between isolation and loneliness. "Loneliness is a subjective sense that your social needs are not being met, while isolation is about being physically separated from others," she says. "A person can be physically isolated and not feel lonely, while another can be surrounded by family but may feel lonely because of a lack of meaningful connection. Both are important considerations in this current crisis."

A recent survey conducted in the US by the American Enterprise Institute think tank over five days from 26 March found that 53 per cent of people reported feeling lonely or isolated at least once in the past week, and more than one-third reported feeling this at least a few times. As part of the Loneliness and Social Isolation in Mental Health Network, Mann and her colleagues are developing a study into the impact of the covid-19 crisis on people with mental health problems – and what measures may prove beneficial. "Previous research suggests that volunteering can help loneliness, both for the person being supported and the volunteer," she says. "Volunteering to give people a phone call or delivering medicines safely could be ways to feel actively connected."

Social media is helping many to stay in touch with others while socially distancing, but it can also be harmful, says Rina Dutta at King's College London, who researches social media and smartphone use among young people. Some may feel unable to stop looking for the most current news. "Because it is 24/7, it can become overwhelming, leading to obsessional preoccupation and fixation, and exclusion of other activities," she says. This is always a danger, she points out, "but when we are not in a pandemic, we can encourage young people to get a balance between screen time and other activities such as seeing friends and going to the cinema – now you can't do those things". It is important to get creative, she says, and find safe, alternative activities that can be done at home, such as exercise or board games.

While this is undoubtedly a stressful and upsetting time, that doesn't necessarily mean it will harm us psychologically, says Greenberg. It is important to remember that "distress and frustration are not mental health problems", but a normal, reasonable and necessary emotional response

Bulletin Board

Curiosities

MAY. 08, 2020

to what is going on. Malik agrees. "This is a normal response, but it being normal doesn't make it easy," she says.

The strain on couples, families and young people

In the first week of lockdown in the UK, couples therapy charity Tavistock Relationships saw a 40 per cent increase in searches for its online services compared with previous weeks. To many people, it probably comes as little surprise that the demands of social distancing and lockdown amplify any problems in a relationship, and create new strains – especially when you add healthcare worries, childcare pressures, financial uncertainty and cramped living conditions to the mix.

Couples often seem to share their anxiety through "unintended turn-taking", says Tavistock Relationships psychotherapist Catriona Wrottesley. At a certain point, one partner might feel highly anxious, while the other feels calm, then they swap. "The anxiety is held within the couple system, but doesn't necessarily lodge permanently with one partner or the other," she says. While this can be helpful in some partnerships, in others it can create conflict. "If a couple can't manage a difference in response to anxiety or risk management, it can feel as if one is against the other. One partner can feel that the other doesn't understand or care about them. That seems to be very common." She adds that during a lockdown, when physical space is limited, an internal sense of psychological space can also feel restricted, and feelings of claustrophobia can build greater pressure – even for couples without children.

Having children was also associated with a higher risk of anxiety and depression during the first week of lockdown in Bentall's UK study. And there are particular characteristics of the covid-19 pandemic that make it acutely problematic for families, says Nicola Labuschagne, a clinical psychologist at the Anna Freud National Centre for Children and Families in London. "The coronavirus is an invisible threat, which makes it that much more frightening," she says. "This leaves parents in a state of perpetual anxiety, and that means they have to dig really deep in order to be able to manage their own anxiety, and in order to be able to manage their children's."

Added to this there is the impact of the lockdown, including the closure of schools for most children, which leaves families feeling untethered. "What is having a really important impact on every family's mental health is the complete change in structure," says Labuschagne. "Parents are now having to re-establish different sorts of routines – and when you're anxious about a risk you cannot see, and about being able to pay bills, that is a tall order."

Bulletin Board

Curiosities

MAY. 08, 2020

Children and teenagers may be disproportionately affected by ongoing events, says Danese. There are several reasons for this. "Starting from biology, their brains are still developing, and they may be less able to control their emotional responses, whether to events they perceive as traumatic or to worrying thoughts and uncertainty," he says. "They may struggle with the alarming and sometimes conflicting messages on the news. And, even more than the rest of us, they have had an unprecedented disruption of their normal experiences like education and socialising."

"Young adults in the US reported much more frequent feelings of loneliness than older people"

Young people are also feeling the effects of loneliness. In the American Enterprise Institute survey, young adults reported much more frequent feelings of loneliness than older people, with 48 per cent of those aged 18 to 29 saying they have felt lonely or isolated at least a few times in the past week, compared with just 20 per cent of those aged 65 and older.

On a more positive note, Danese points out that the pandemic, as an event that is unrelated to interpersonal relationships – unlike, say, bullying or abuse – is typically associated with the lowest risk of developing mental health conditions. He is currently developing models for individualised risk prediction, to try to identify those young people who are generally likely to be less resilient and so more at risk of developing mental health problems. This would allow more resources to be allocated to those predicted to be most vulnerable.

The impact on vulnerable groups

These are undoubtedly tough times for everyone, but for certain groups the mental health impact is particularly concerning. "We are extremely worried about people with severe mental health problems, including schizophrenia, depression and bipolar disorder," says Allan Young, director of the Centre for Affective Disorders at King's College London. "We know that there is an annual spring peak in suicide and relapses in bipolar disorder, especially mania, and one of my great worries is that we'll have more of this."

For families with mental health problems, the situation can deteriorate very quickly, says Labuschagne. "A crisis like this can really exacerbate pre-existing conditions and pre-existing deficits in a parent's ability to manage their emotions," she says. "When that is escalated, with no outlet because everybody's locked in together, it can be very, very difficult for

Bulletin Board

Curiosities

MAY. 08, 2020

children.” For many at-risk children, school is a place of safety and support. “The loss of school – not just the loss of routine, but also of particular teachers who can help children to have a good experience of managing anxiety – is crucial. I think there could well be long-term negative effects of this,” she says. UK mental health charity Young Minds recently surveyed young people with a history of mental health needs and found that more than 80 per cent reported a worsening of their conditions as a result of the pandemic.

Labuschagne and her colleagues work with families, offering intensive help at least twice a week. “These are the families we know are vulnerable, who are known to the local authority and to social workers because of the impact of the parents’ mental health on their ability to parent their children safely and consistently,” she says. “They do not have Wi-Fi, they are living in poverty, in two or three rooms, and they have children who are at serious risk of harm. These parents have openly expressed their frustration at not being able to cope.” The service has had to close its doors during this crisis, but staff are still working, calling families twice a week, and suggesting play activities and other strategies.

Existing mental health inequalities, which particularly disadvantage people from low socio-economic and ethnic minority backgrounds, are also likely to widen during the pandemic. “We do project that this is going to have a significant impact, and amplify the existing mental health inequalities, and that these are going to be long-lasting effects,” says Stephani Hatch, a sociologist and epidemiologist at King’s College London. It is possible to get a sense of the impact on these groups by looking at research on previous disasters such as Hurricane Katrina, which struck the US in August 2005. “We know that unemployment, job loss and financial strain are very detrimental to mental health in the immediate, medium and long term, particularly as there is stress proliferation, which is when an acute stressor becomes a chronic strain over time because of the knock-on effects on relationships and finances,” says Hatch.

Stephen Blumenthal, a psychologist at the Tavistock and Portman NHS Trust in London, also points out a worrying rise in calls to organisations that help people experiencing domestic abuse.

The psychological health of people with addictions, too, will be under greater strain. Some people with alcohol and drug addictions are going to be isolated from friends and family, as well as sources of support such as Alcoholics Anonymous and Narcotics Anonymous, at a time when they are feeling particularly anxious, and there is serious risk of relapse.

Bulletin Board

Curiosities

MAY. 08, 2020

It is vital that vulnerable people can access help, says Blumenthal. "Troubled individuals need to be able to talk to professionals. Advice is not sufficient."

How do we protect front-line workers?

In Milan, Brambilla and his colleagues have created an outpatient service for healthcare workers at the local Policlinico Hospital that includes mental health support delivered remotely. "I'm worried about them," he says. "It's tough work, it's stressful. They're asking for help with anxiety, with insomnia, with depressive symptoms."

Experiences from the military can offer insights. "The challenges faced by troops include not just threats to their own life, but also threats to their sense of what's right and wrong," says Greenberg. Having spent more than two decades in the military, Greenberg now specialises in psychological resilience in organisations. "My interest is, how do you look after the mental health of healthcare workers in this pandemic?" he says. "We absolutely need to protect their mental health, and we also need them to save our lives. You can't win a war unless you've got people fighting on the front line." People who deploy on military operations often find themselves stuck in a "horrible position of wanting to do the right thing, but not being able to do it", he says. This violation of a person's moral code through the actions – or inaction – they are forced to take can lead to psychological distress, a problem known as "moral injury".

Healthcare professionals, too, may find themselves in this position, unable to deliver the care they want because of the number of patients and a lack of staff and vital equipment such as ventilators. "Although the challenges are different, the actual impact on one's sense of what's right and wrong, and on one's mental health, can be incredibly similar," says Greenberg. In a recent paper, he and his colleagues argued that if staff don't have the right support, moral injury could lead to mental health problems among those dealing with covid-19, including depression and post-traumatic stress disorder. "It's important to state that moral injury is not a mental illness, but it absolutely puts you in a place where you are psychologically more vulnerable," he says.

For healthcare workers whose mental health was already vulnerable, this is a particularly worrying time. Dutta provides treatment to health staff who have bipolar disorder and treatment resistant depression, and is continuing to do this remotely during the crisis. "The risk of their mental health spiralling downwards is very real," she says.

Bulletin Board

Curiosities

MAY. 08, 2020

“During a crisis front-line staff want to share, connect and make contact”

There are several ways to help reduce these risks and strengthen the resilience of healthcare workers. “Evidence from both military and non-military studies shows that the way people treat their staff is absolutely critical in determining whether they develop mental health problems,” says Greenberg. “Equally as important is whether staff seek help early to try to rectify mental health problems if they develop. It’s inevitable that staff will feel stressed, because it is a difficult situation – but we mustn’t let those early signs of distress develop into moral injuries and mental health disorders.”

Once problems have been identified, it is relatively easy for supervisors to step in, he says. Actions might include altering someone’s duties to give them some respite. Even just a 5-minute chat with a colleague can help after a difficult experience. Greenberg cites a study by the Israeli military showing that the more such practices were applied when soldiers were having an acute stress reaction during the 1982 Lebanon war, the better their mental health was 20 years later. “What we need is for supervisors, managers and colleagues to be looking out for each other,” he says. “We need people to actively monitor those who are providing the front-line services.”

This kind of thinking ties up with that of Lydia Hartland-Rowe, a psychotherapist at the Tavistock and Portman NHS Foundation Trust in London. She is helping to coordinate a project to support the well-being and mental health of 52,000 health and social care staff in London during the coronavirus crisis. This consists of online resources, brief and relevant podcasts, and email and telephone support for managers so that they can better support their teams. From events like the 2017 fire in London’s Grenfell Tower that left 72 dead and the 2005 bombings in the city that killed 52 people, we know that front-line staff don’t want in-depth psychological work during or immediately after a crisis, but “to share, connect and make contact”, she says.

Greenberg agrees that bonds between team members is key. “Some are saying that hospitals are at breaking point, that healthcare workers face an impossible task. But with good leadership and good camaraderie – and the right equipment – you can come through situations that might be described as impossible, and not only do a good job and survive, but also experience something we call post-traumatic growth. A feeling that you did well despite the circumstances. That you feel proud to be a healthcare worker.”

Bulletin Board

Curiosities

MAY. 08, 2020

Need a listening ear? UK Samaritans: 116123 (samaritans.org). Visit bit.ly/SuicideHelplines for hotlines and websites for other countries

newscientist.com, 22 April 2020

<https://www.newscientist.com>

To Get Around Stay-At-Home Orders, Spaniards Have Been Walking Some Unusual 'Pets'

2020-04-24

The Spanish government's strict stay-at-home order allows people to leave their homes to walk their pets.

Well, that order has prompted some to get a little creative with what the government means in terms of "pet."

On Friday the Spanish National Police tweeted an image of a man getting fined for "walking" a fish in a bowl in Logroño, a town in northern Spain. He was penalized for violating government orders to stay inside due to the coronavirus pandemic.

However, he is not alone.

On March 16, footage of a man being confronted for walking a toy dog on a leash was released on the Spain's national police union Twitter page. The police union urged people not to try to deceive the police.

On the same day, the police department in the southeastern city of Murcia tweeted video showing an unidentified citizen being stopped by police while trying to walk the streets dressed as a Tyrannosaurus rex.

Earlier this week, the Spanish Parliament extended the country's state of emergency to May 9, prolonging the country's stay-at-home order to eight weeks in total. The European country has recorded more than 20,000 deaths due to the novel coronavirus.

edition.cnn.com, 24 April 2020

<https://www.edition.cnn.com>

On Friday the Spanish National Police tweeted an image of a man getting fined for "walking" a fish in a bowl in Logroño, a town in northern Spain.

Bulletin Board

Curiosities

MAY. 08, 2020

Rice Genetically Engineered To Resist Heat Waves Can Produce Up To 20% More Grain

2020-04-21

As plants convert sunlight into sugar, their cells are playing with fire. Photosynthesis generates chemical byproducts that can damage the light-converting machinery itself—and the hotter the weather, the more likely the process is to run amok as some chemical reactions accelerate and others slow. Now, a team of geneticists has engineered plants so they can better repair heat damage, an advance that could help preserve crop yields as global warming makes heat waves more common. And in a surprise, the change made plants more productive at normal temperatures.

“This is exciting news,” says Maria Ermakova of Australian National University, who works on improving photosynthesis. The genetic modification worked in three kinds of plants—a mustard that is the most common plant model, tobacco, and rice, suggesting any crop plant could be helped. The work bucked conventional wisdom among photosynthesis scientists, and some plant biologists wonder exactly how the added gene produces the benefits. Still, Peter Nixon, a plant biochemist at Imperial College London, predicts the study will “attract considerable attention.”

When plants are exposed to light, a complex of proteins called photosystem II (PSII) energizes electrons that then help power photosynthesis. But heat or intense light can lead to damage in a key subunit, known as D1, halting PSII’s work until the plant makes and inserts a new one into the complex. Plants that make extra D1 should help speed those repairs. Chloroplasts, the organelles that host photosynthesis, have their own DNA, including a gene for D1, and most biologists assumed the protein had to be made there. But the chloroplast genome is much harder to tweak than genes in a plant cell’s nucleus.

A team led by plant molecular biologist Fang-Qing Guo of the Chinese Academy of Sciences bet that D1 made by a nuclear gene could work just as well—and be made more efficiently, as its synthesis in the cytoplasm instead of the chloroplast would be protected from the corrosive byproducts of photosynthetic reactions. Guo and colleagues tested the idea in the mustard *Arabidopsis thaliana*. They took its chloroplast gene for D1, coupled it to a stretch of DNA that turns on during heat stress, and moved it to the nucleus.

Bulletin Board

Curiosities

MAY. 08, 2020

The team found that modified *Arabidopsis* seedlings could survive extreme heat in the lab—8.5 hours at 41°C—that killed most of the control plants. The same *Arabidopsis* gene also protected tobacco and rice. In all three species, photosynthesis and growth decreased less than in the surviving control plants. And in 2017, when Shanghai exceeded 36°C for 18 days, transgenic rice planted in test **plots yielded 8% to 10% more grain than control plants**, the team reports this week in *Nature Plants*.

The shock was what happened at normal temperatures. Engineered plants of all three species had more photosynthesis—tobacco's rate increased by 48%—and grew more than control plants. In the field, the transgenic rice yielded up to 20% more grain. "It truly surprised us," Guo says. "I felt that we have caught a big fish."

Veteran photosynthesis researcher Donald Ort of the University of Illinois, Urbana-Champaign, says the group presents credible evidence of plant benefits, but he's not yet convinced that the D1 made by nuclear genes could have repaired PSII in the chloroplast. "Anything this potentially important is going to be met with some skepticism. There are lots of experiments to do, to figure out why this works," he says.

Guo plans further tests of the mechanism. He also has a practical goal: heftier yield increases in rice. The productivity boost his team saw in modified *Arabidopsis* was the largest of the three species—80% more biomass than controls—perhaps because the researchers simply moved *Arabidopsis*' own D1 gene. Guo thinks rice yield might also burgeon if it could be modified with its own chloroplast gene rather than one from mustard—further heating up these already hot results.

sciencemag.org, 21 April 2020

<https://www.sciencemag.org>

Archivists Uncover Earliest Evidence Of A Person Being Killed By A Meteorite

2020-04-22

Tales of people being killed by meteorite impacts date back to biblical times. But few deaths, if any, have been documented. Now, Turkish researchers have uncovered the earliest evidence that a meteorite killed one man and paralyzed another when it slammed into a hilltop in what is now Iraq in August 1888.

In addition to the human casualties, some crops and fields were significantly damaged, the letters report.

Bulletin Board

Curiosities

MAY. 08, 2020

Documents chronicling the event were found in Turkish state archives, the team reports online today in *Meteoritics & Planetary Science*. According to one of three letters written by local authorities in the region shortly after the event, the killer meteorite was one of several that fell during a 10-minute interval. Reports of a fireball seen in a city nearby suggest the object approached the area from the southeast before it blew up high in the atmosphere (artist's representation of a meteorite strike pictured above).

In addition to the human casualties, some crops and fields were significantly damaged, the letters report. One of the letters was also supposedly accompanied by a sample of the meteorite, but the researchers have yet to find that object in Turkish archives or museums, they note.

Further searches of the millions of documents recently digitized may yield more information about the event.

***Correction, 23 April, 10:20 a.m.:** *This item has been updated to reflect the fact that few or no meteorite deaths have been documented in the past decade.*

sciencemag.org, 22 April 2020

<https://www.sciencemag.org>

Praying For Rain

2020-04-21

Etched into the face of a red sandstone cliff in the arid highlands of northwestern New Mexico is an unlikely image: a delicately outlined fish. Dozens of petroglyphs surround it, carved centuries ago by the ancestors of the pueblo tribes who still live in the region. They depict antelopes, humans, supernatural beings, spirals and other figures. The antelope and human forms don't seem out of place, but a fish, here on a dry scabbly plateau incised with ravines?

"What this tells me is there was once a helluva lot more water here," says Jim Enote, a 63-year-old Zuni farmer and tribal historian whose forebears were cultivating this land long before the first Europeans arrived on the continent. "Some of these petroglyphs are 1,500 years old. They're a testament to how long we've been here."

Tribal lore and the archaeological record indicate a very long presence of a people who developed unique agricultural methods and bred crops

The drought's impact on wildlife has cost the tribe lost revenue from the sale of hunting and fishing permits.

Bulletin Board

Curiosities

MAY. 08, 2020

exquisitely adapted to a land perpetually threatened by drought. The ancient civilization from which the Zuni and other pueblo tribes of the Southwest descend left behind multistory dwellings, networks of roads, astronomical markers, tools for grinding corn and bins for storing it.

Aside from enigmatic petroglyphs, the ancestral puebloans left no written record of what must have been an epic history. Many of the most spectacular sites—like the 600 cliff dwellings at Mesa Verde in southern Colorado, or the enormous pueblo complex of Chaco Canyon in northern New Mexico—were abruptly abandoned about 900 years ago. Tree-rings and other data suggest that a prolonged drought, which may have dragged on for 50 lethal years, caused widespread societal collapse.

That history has become disturbingly relevant. For the last 20 years an extreme drought has gripped much of the Southwest. Maps generated by the National Drought Information System invariably show the Zuni homeland to be one of the most parched sections of the country. The tribe has already declared three drought emergencies in the last 15 years, prompting the construction of new water hauling sites and restrictions on the community's water use. The drought's impact on wildlife has cost the tribe lost revenue from the sale of hunting and fishing permits. Meanwhile, farmers and ranchers face increased predation on livestock and more crops lost to elk and other wild herbivores desperately seeking forage.

As climate change takes hold, it's likely that states of emergency will become the new norm, with droughts even more devastating than those that toppled the Southwest's pre-Columbian cultures. One climate scientist has warned that "the 21st-century projections make the megadroughts [of the past] seem like quaint walks through the Garden of Eden."

What impact will a changing climate and perpetual drought have on the 11,000 residents of the Zuni reservation? The tribe has weathered a litany of existential challenges over the centuries, from the intrusion of the first conquistadors in 1540 to the arrival of Anglo settlers in the 19th century. And still older tribulations are hinted at in the petroglyphs. Kneeling by the sandstone rock face, Enote points to an engraved spiral, a symbol, he says, of the migrations the Zuni made across the Southwest before settling in their present home here on a 720-square-mile reservation. Some of those ancient odysseys must have been driven by the catastrophic droughts of the past, with entire peoples on the move in search of land that could sustain them. Now the same threat, horribly amplified, looms

Bulletin Board

Curiosities

MAY. 08, 2020

over their descendants—indeed, over all of us. “The big question for me,” says Enote, “depending on how extreme climate change will be, is can we adapt?”

Five years ago a team of scientists from Cornell, Columbia, and NASA published a paper with an unsettling conclusion: if greenhouse gas emissions continue to increase at the current rate, the risk of a “megadrought” hitting the Southwest—one that lasts for 35 years or more—will exceed 80 percent by the end of the century. Since global carbon emissions hit an all-time high last year, the odds continue to mount in favor of a megadrought worse than the civilization-killer of a thousand years ago. Last week, scientists from NOAA, NASA, and four universities reported that the megadrought may already be underway. It’s a sobering prospect, given that the ancient megadrought outstripped anything in the historical record.

“Things like the Dust Bowl or the recent California droughts or the 1950s drought in Texas, as big and as bad as they were, they don’t compare with some of the worst events that we see going back a thousand years,” says Ben Cook, a climate scientist at NASA’s Goddard Institute for Space Studies in New York and the lead author of the 2016 study. “We know there were big droughts in the past that eclipse any of our contemporary experiences. There are very few places that have experienced megadroughts. I can’t think of any other region, at least in recent Earth history, that has ever experienced 20- to 50-year droughts [like the ones] that we have documented in the Southwest.”

As global temperatures continue to rise in the decades ahead, evaporation in the world’s arid areas will climb in lockstep, and precipitation will decrease, trends now underway. “When we’re looking at climate change impacts, they scale with the warming,” says Cook. “The more warming that happens, the worse these events—like droughts, floods and extreme precipitation—are likely to be. It’s going to be a combination of lack of water and these hot temperatures that are really going to make these events different from those of the past. None of this is inevitable. But the science is clear: these are the sort of events that are likely to get more severe and intense in a warmer world.”

From the top of Black Rock Dam on the Zuni reservation that drier world isn’t hard to imagine—it’s already here. Built in 1908, as part of an effort to modernize traditional Zuni agriculture, the 80-foot-high dam was designed to hold 15,000 acre-feet of water—enough to cover 15,000 acres to a depth of one foot. But apart from a small shallow pool from some rare

Bulletin Board

Curiosities

MAY. 08, 2020

recent rain, there's no water in sight. Stands of juniper, cottonwood, and sage grow on land that should be under water.

"I can't remember the last time water was released from Black Rock Dam," says Kirk Bemis, the Zuni tribe's hydrologist, as he looks out at the waterless expanse. "At least 15 years ago. This is the safest, most up-to-date dam we have and it's in our most populated farming district. You just need to add water!"

Bemis, who is half Zuni on his mother's side, once dreamed of being an astronaut. He got close, working as an engineer at NASA before returning to the reservation 25 years ago. Two of his uncles are priests in one of the tribe's six ancient religious orders, each with its own elaborate rites and restricted membership. He seems comfortable in two worlds, one technical, one traditional. His efforts to bridge them can be challenging at times, especially when he raises the issue of climate change as something the tribe should prepare for.

"We have a cultural taboo about predicting bad things," says Bemis. "Our religion is all about bringing precipitation here. Everything is about asking for the blessing of moisture from the ancestors and deities. If you tell the Zuni it will snow and rain less, you're telling them that their prayers will be less effective."

In any case, says Bemis, drought is nothing new here. "For us, climate change means more of the same." After all, what lessons can the Zuni learn from a dominant culture with a dubious record of environmental stewardship? The construction of Black Rock Dam, for example, accelerated the decline of Zuni farming, and permanently changed the landscape.

For centuries, the Zuni, Hopi, and other pueblo tribes of the Southwest practiced a type of agriculture that enabled them to produce bumper crops of corn, beans, and vegetables in a region that receives about 12 inches of rain annually in good years—less than a quarter of the precipitation of a corn belt state like Ohio. Rather than planting and irrigating the same plots year after year, the Zuni rotated their fields, locating them near the bases of mesas to capture ephemeral runoff from seasonal storms. Remnants of small dams that channeled runoff water have been found at Chaco Canyon, Mesa Verde, Casas Grandes, and other sites.

With runoff agriculture the Zuni thrived for centuries. When the gold-seeking Spanish explorer Francisco Vazquez de Coronado encountered

Bulletin Board

Curiosities

MAY. 08, 2020

them in the summer of 1540 he noted in a letter to his superiors that the Zuni "...are well-nurtured and conditioned...they eat the best cakes that ever I saw..." Runoff farming spread nutrients from the mesa tops out across the lowlands, and the channeling and slowing of storm flows reduced erosion. The numberless arroyos that now seem to be endemic, natural features of the Southwestern landscape may be a consequence of the abandonment of traditional farming practices.

"Traditionally corn farming was at the edge of a valley, close to mesas," says Bemis. "Those fields couldn't be used with modern irrigation because of the slope. So places in the valley that hadn't ever been irrigated were [irrigated]."

Black Rock Dam, which had been a showcase irrigation project of the Bureau of Indian Affairs, started to fill with silt soon after its completion. Silt deposits from the intermittent flows of the Zuni River and its tributaries eventually cut the dam's capacity from 15,000 acre-feet to 2,500. "In the late 1990s there was a \$20 million project to fix Black Rock Dam," says Bemis. "But since then there hasn't been enough water to test these improvements. There hasn't been water here for so long that some community leaders have proposed building a baseball field here. It shows you how soon people forget with drought conditions."

Zuni agriculture had already been under pressure from the federal government even before the dam's construction. With the Allotment Act of 1887, the United States attempted to integrate tribes into the mainstream by transferring what had been tribal commons to individual farmers. By allowing families to sell their plots, the act fragmented Indian lands. Within 20 years tribes all across the country lost nearly half their territory. "It was a way to break up the tribes by assigning plots to individuals," says Bemis. "Traditionally farms were communally operated, not fenced off into land regarded as 'mine.' Here on Zuni there were only a few allotments, so we were lucky. But that started the decline of Zuni agriculture."

Today the reservation comprises five agricultural districts, but only a handful of people in those districts are actually growing anything, says Bemis. The combination of drought, misguided federal policies, and economic pressures have decimated Zuni farming. In a community with a 70 percent unemployment rate, the risks and effort far outweigh the rewards.

"Most farming here is not commercial," says Bemis. "It's for a little extra income or for personal use. If your field is far from your home, elk can come by and consume your entire summer's work. In the old days farming

Bulletin Board

Curiosities

MAY. 08, 2020

was about survival. You didn't have a choice. Now you can go to the store to buy corn. One of our dilemmas is how to revitalize farming."

Some of the most sacred treasures of the Zuni people—precious links to their past and future—aren't sequestered in religious shrines, or locked away in museums. They're kept in a small one-story building that houses the Zuni Sustainable Agriculture Program, carefully tended by Daniel Bowannie, the 37-year-old technician and sole staff member of the project. The door of the boxy white refrigerator in Bowannie's office is covered with his children's doodles, so visitors might not immediately notice the piece of paper taped to the top of the fridge, which identifies it as the Zuni Community Seed Bank.

The refrigerator contains dozens of heirloom seed varieties—corn, melon, beans, and more—which have been collected since the program started in 1992. "Probably about 40 different families of seeds," says Bowannie. "All seeds are sacred to us." For the Zuni, agriculture itself is a religious practice, and locally grown seeds remain essential for many rituals. "There are two things we pray for: seeds and water," says Darren Sanchez, who works for the tribe's conservation program in an office next to Bowannie's. "We can't survive without them."

The seeds in Bowannie's refrigerator are unique, the product of countless generations of breeding drought-tolerant varieties by pueblo farmers. The corn, for example, can send roots 20 feet into the soil in search of water, and though the plants may grow only 3 or 4 feet high, they produce many ears. Bowannie started adding to the collection shortly after he was hired in 2003 to run the program. "I wanted to be a smoke jumper," he says, "but my grandparents pulled me back to traditional life."

He managed to get a few seeds from elderly Zuni farmers, but his most valuable source turned out to be another ancient community. "For heirloom seeds I reached out to my relatives, the Hopi." The Hopi, whose reservation lies in northeastern Arizona, also see agriculture as a spiritual practice, and runoff farming is still a living tradition there. In 2008, Bowannie described his plans to provide heirloom seeds for the Zuni community to about 20 elders gathered at the Hopi Department of Natural Resources building. "The elders told me, 'We don't care about money,'" Bowannie recalls. "'These aren't Hopi seeds—they're Zuni seeds. A long time ago you gave us seeds.'" At some point in the past, it seems, the Zuni had helped the Hopi during a time of need. Now, perhaps centuries later, the Hopi were returning the favor. Though they did ask for one thing in return: salt from a sacred lake.

Bulletin Board

Curiosities

MAY. 08, 2020

Zuni Salt Lake, home of the Salt Mother Deity, lies about 60 miles south of the reservation. During the dry season, most of the shallow lake evaporates, and the salt left on the dry lake bed has been gathered by pilgrims since before the collapse of the ancient pueblo civilizations. The Zuni control access to the lake, and even among the Zuni only the men are allowed to harvest salt. Since Bowannie himself had never gone before, he asked a coworker to collect salt that he could exchange for the Hopi seeds. So one day in 2008 in a parking lot in the city of Gallup 40 miles north of the reservation, Bowannie traded 22 sandbags full of salt for some Hopi seeds.

If the Zuni ever manage to revitalize their agricultural traditions, the trove in Bowannie's refrigerator will enable them to plant the seeds of their ancestors. For now, those seeds are used to grow corn for religious ceremonies, and to teach Zuni schoolchildren the rudiments of traditional gardening methods; they are also distributed to a few committed farmers. Bowannie recalls how he learned to plant his first waffle garden, a quintessential Zuni horticultural technique where vegetables are grown on a bed of soil divided into a grid of small squares with raised earthen sides a few inches high. The plants within each square would be carefully hand-watered, ladle by ladle.

"I asked an elder, 'What is the secret of waffle gardens?'" says Bowannie. "She said, 'You're not ready to listen to my stories. Why am I going to give this to you? You haven't earned it. It won't be appreciated in your heart in the same way it is for me. Go and plant a garden. Then come back and talk to me.' She wanted me to take the initiative. Then she would step in and help. I started a garden and that opened up a conversation."

All that accumulated agricultural wisdom expresses something much more fundamental about Zuni culture. Driving back from Black Rock Dam, Bemis mentions that scientists occasionally visit the reservation, seeking indigenous knowledge about dry-land farming. "When they come here and ask about our traditional practices, I really have to think," says Bemis. "What practices do we really still do? No one uses digging sticks (for digging out tubers and roots) anymore! The one tool that has survived is the belief system: the prayers, the ceremonies, everything that goes with that. That is the number one thing that has survived, and it developed, I'm sure, as a response to climate and extremes. That was the foundation for everything, and that is what has allowed us to live here and survive for all these years in a harsh environment. Technologies come and go, but a belief system, that becomes a way of life. It stays and grows. That's the most important thing that has survived."

Bulletin Board

Curiosities

MAY. 08, 2020

Not all Zuni have relinquished the old farming ways. Late on a bright November day Jim Enote shows a pair of visitors a cornfield he has tended for as long as he can remember. It's fallow now; the harvest of multicolored ears of corn is safely stored in bins at his home, along with beans, chiles, squash and more. On the horizon to the west of his field, bathed in golden light, stand the ruins of Hawikku, the pueblo where the Zuni were living when the first conquistadors arrived, vainly searching for mythical cities of gold. Maybe they too saw sunlight one late afternoon, gleaming on whitewashed pueblo walls.

"I've been planting for 62 years," says Enote. "When I was in a cradleboard, my aunties and grandmother would put seeds in my hand." Enote, tall and silver-haired, has been planting seeds ever since, and shares his knowledge on many fronts. Most recently he has started a non-profit organization, the Colorado Plateau Foundation, which aims to promote sustainable agriculture and protect native lands and languages.

"Our culture was built around growing food," he says. "Planting food connects you to all these things: the soil, the weather, the creatures that share this world with us, and the moon and the sun. When you put your hands in the soil, you feel how cold or how warm or how dry or how wet it is. It connects you to all these things we pray for. We're at a tipping point. People will either make the decision to grow traditional crops in the traditional manner or they won't. I think that would be a tragedy. I always tell the kids, just plant something in the ground and take care of it."

[thefern.org](https://www.thefern.org), 21 April 2020

<https://www.thefern.org>

Rare 'Killer' Mutations Present At Birth Could Be Taking Years Off Your Life

2020-04-24

Scientists have discovered a handful of ultrarare mutations present in our cells from birth that likely shave years off a person's life. Each of these DNA variants, most likely inherited from our parents, can reduce life span by as much as 6 months, the researchers estimate. And different combinations can dictate how long people live before developing age-related diseases such as cancer, diabetes, and dementia.

A person's genes don't set a specific natural life span—diet and many other factors play large roles, too—but studies have shown that DNA variants can influence the aging process. Biologists chalk up less than

Biologists chalk up less than one-third of that influence to the genes we inherit.

Bulletin Board

Curiosities

MAY. 08, 2020

one-third of that influence to the genes we inherit. The source of other age-influencing DNA variation is environmental: Sun damage, chemical exposure, and other insults that create thousands of random mutations. Each cell's collection of these environmental mutations differs, and most don't greatly impact a person's life span.

Hunting for these rare mutations, which are found in less than one in every 10,000 people, required a group effort. Harvard University geneticist Vadim Gladyshev, a senior co-author in the new study, partnered with academic colleagues and a biotech company called Gero LLC to scour the UK Biobank, a public database containing the genotypes of about 500,000 volunteers.

Using more than 40,000 of these genotypes, the team looked for correlations between small changes in DNA and health conditions, a so-called genomewide association study. Specifically, the variants they were targeting knock out genes entirely, depriving all the cells in the body of certain proteins.

On average, each person is born with six ultrarare variants that can decrease life span and "health span," the amount of time people live before developing serious diseases, the team reports this month in *eLife*. The more mutations, **the more likely a person was to develop an age-related illness at a younger age or die.** "The exact combination matters," Gladyshev says, but in general, each mutation decreases life span by 6 months and health span by 2 months.

The results build on what is already known about aging: "Family genes" matter. But rather than studying the common mutations found in especially long-lived people, researchers can now target rarer variants present in everyone. Gladyshev hopes this information can be used in clinical trials to categorize participants by their mutations in addition to things like gender and actual age.

He admits the findings are potentially controversial, as they minimize the perceived contribution to aging of environmental "somatic" mutations acquired throughout life. Somatic mutations "live in a larger universe of age-related changes" influenced by lifestyle, he says, adding that changes to hormone and gene expression also come with age. "They [all] contribute to the aging process, but on their own they do not cause it."

Jan Vijg, a geneticist at the Albert Einstein College of Medicine who studies the role of somatic mutations in aging, agrees, though he adds

Bulletin Board

Curiosities

MAY. 08, 2020

that somatic mutations can still cause diseases such as skin cancer that decrease life span.

Alexis Battle, a biomedical engineer at the Johns Hopkins University School of Medicine, points to an important caveat, however: The new research only looked at the “exome,” the 1% of the genome that actively builds the proteins that direct our cells. The rest is largely a black box, although growing evidence shows it can affect gene expression. Both Battle and Vijg agree that this DNA could be even more important in aging than the regions targeted by Gladyshev and his colleagues.

Going forward, Gladyshev would like to repeat his analysis on DNA from **centenarians**: those that live to be older than 100. “Most of the previous research focused on what these people have that makes them long-lived,” he says. “But [we want to look at] the opposite—it’s what they don’t have.”

[sciencemag.org](https://www.sciencemag.org), 24 April 2020

<https://www.sciencemag.org>

Dingoes Are Both Pest And Icon. Now There’s A New Reason To Love Them.

2020-04-22

BY JANUARY, when the world turned its attention to Australia’s bush-fire crisis, Murray Ings had been battling blazes near his home in the hills of northern New South Wales for months. A third-generation forestry worker and volunteer firefighter, Ings worked shifts of up to 16 hours, sometimes through the night, in apocalyptic conditions. It got so hot, the sand in the soil melted to glass, causing the ground to shine. “That’s a furnace,” says Ings. But what he remembers most vividly is the “haunting, piercing” screams of dying animals. “It’s the worst sound you can ever hear,” he says.

With the fires now extinguished, parts of the native forest on Ings’s property resemble a wasteland. “In areas, we’ve lost the whole lot: all the trees, all the animals,” he says. That’s just on his 500 hectares. Across south-east Australia, some 19 million hectares burned. The federal government has set out a multi-million-dollar restoration programme. It is a huge task that could take decades – even if major fires don’t erupt again.

However, amid efforts to restore Australia’s native fauna, one animal is expected to continue dying. Dingoes, a type of semi-wild, primitive dog, are widely considered pests, the threat they pose to livestock trumping their status as a native species. Yet there is mounting evidence that these

However, amid efforts to restore Australia’s native fauna, one animal is expected to continue dying.

Bulletin Board

Curiosities

MAY. 08, 2020

apex predators play a key role in maintaining ecological balance. They might even be as central to restoring the bush as wolves have been in rewilding Yellowstone national park in the US. But for that to happen, Australians will need to put an end to centuries of bad blood with their native canid.

It was thought that people brought the ancestors of the dingo to Australia from South-East Asia around 5000 years ago, although new evidence hints at a different origin story (see “What is a dingo?”). Regardless of how and when they arrived, dingoes were quickly integrated into Aboriginal communities, reared from pups to be pets, to help with hunting and to act as guards. On reaching maturity, however, these “camp dingoes” are thought to have gone into the bush to breed.

This mutually beneficial relationship between people and predators ended abruptly with the mass arrival of European settlers in 1788. Dingoes were the most obvious threat to their livestock, being one of just two large, land carnivores in Australia. The other, the thylacine, was confined to Tasmania by that time and was eventually hunted to extinction, as far as we know. “Dingoes were painted as a villain quite early on,” says ecologist Thomas Newsome at the University of Sydney. In the 1880s, a barrier known as the “dingo fence” was built along some 5600 kilometres to protect the south-eastern corner of the continent. It is still maintained today, at an annual cost of A\$10 million (£5 million). As a pest control effort, it is without parallel, says Newsome.

More recently, the dingo’s public image has become inextricably intertwined with one of the most sensational episodes in Australia’s recent history: the death of baby Azaria Chamberlain at Uluru in 1980. After 30 years and four inquests, a coroner eventually ruled that she had been taken from her cot by a dingo. This, and a few other attacks by dingoes, casts a long shadow, in which anti-dingo attitudes can thrive, says Newsome. Mike Letnic, a conservation biologist at the University of New South Wales, likens the “culture wars” over dingoes to that over badgers and foxes in the UK. “It’s fraught with all sorts of things: scientific uncertainty, lots of politics, history,” he says. “It’s deeply intertwined.”

Attitudes towards the dingo are certainly mixed. The vast majority of Australians, living on a sliver of highly urbanised coastline, may have romantic notions of it as an iconic national species. But in rural communities, anti-dingo sentiment still runs deep. Most countries with apex predators have reached an equilibrium between conservation concerns and farmers’ interests – albeit often an uneasy one, as with the

Bulletin Board

Curiosities

MAY. 08, 2020

recent return of wolves to continental Europe. Australia has never come close.

“Across Australia, the killing of dingoes is permitted, and in some states it is mandated under pest control laws”

Across Australia, the killing of dingoes is permitted – and in some states mandated under pest control laws – in the name of exterminating “wild dogs” that roam the bush, preying on livestock and native animals. In legislation, the term wild dogs is applied equally to dingoes, feral domestic dogs and hybrids of the two. The fact that dingoes and domestic dogs can interbreed and produce fertile offspring only complicates matters. Even biologists can’t agree on how to classify dingoes. Six years ago, Letnic co-authored a paper arguing they should have their own species name: *Canis dingo*. So far, this has been contested or ignored, with dingoes generally being considered a subspecies of domestic dog or wolf.

There is no doubt that wild dogs, dingoes included, are a problem for farmers. Since 2014, the National Wild Dog Action Plan – a joint government and industry effort, funded by meat, wool and livestock bodies – has led the response, in coordination with state and territory-specific strategies. The plan estimates that wild dogs cost the agricultural sector A\$89 million annually. Its coordinator, Greg Mifsud, describes the dingo as “simply a wild-living dog, a predator that attacks, maims and kills”. However, he adds, the plan acknowledges the environmental and cultural significance of dingoes and only controls them where they “pose a risk or impact upon agricultural, biodiversity and social assets”.

In practice, however, even where pest control policies aim to conserve dingoes, little distinction is made between them and feral domestic dogs. A good balance hasn’t been struck, says Kylie Cairns at the University of New South Wales. “The biggest threat to dingoes is lethal control,” she says. “How are you supposed to conserve an animal when you also consider it a pest species that must be eradicated?”

Poison rain

Of particular concern is aerial baiting. The practice, which entails dropping meat laced with a controversial poison called 1080, is central to most wild dog control programmes, even in some national parks and state forests. This scattergun approach takes a huge toll on non-targeted species. What’s more, there is little evidence that it is effective at protecting livestock from dingoes in the long run. In the short term, however, baiting can decrease

Bulletin Board

Curiosities

MAY. 08, 2020

dingo pack size by as much as 90 per cent and fracture their social structures.

Dingoes are too adaptable and widely dispersed to be in danger of outright extinction. However, entire populations have already been eradicated from some regions, especially those dependent on farming; and there is a high risk of local extinction in others, especially in the south east.

Mifsud says claims that wild dog control isn't targeted are "simply untrue". In fact, he argues that control is protecting dingo populations by limiting opportunities for cross-breeding with feral domestic dogs. Cairns doesn't buy this. "It's not helping the conservation of dingoes, to kill other dingoes," she says. The presence of any domestic dog genes in dingoes, making them hybrids, has been "weaponised" against these animals, she says. "I think that lens has been really dangerous, because it means that we have a negative view of anything that isn't strictly 'pure'. And there's no real ecological or biological reason why that necessarily needs to be happening."

Besides, Cairns's recent research with Letnic suggests the issue of hybridisation has been overstated. Analysing the DNA of 783 wild dogs killed by pest control in eastern New South Wales, they found only five animals were feral domestic dogs with no dingo DNA. The majority were more than 75 per cent dingo, "indicating that they need those genes to live in the wild", says Cairns. Moreover, one in four was "pure" dingo – suggesting that lethal control programmes are putting the genetic integrity of dingoes at risk. "We do have populations that are of really high conservation value, but we're making no concessions to protect them," says Cairns.

Those vulnerable packs will soon be dealt another blow by the bush-fire recovery programme. Of the federal government's A\$50 million package, up to A\$7 million has been earmarked for emergency interventions, including pest control. With habitats under pressure after the fires, vulnerable native species are at even greater threat from predation and competition from invasive pests such as feral cats and foxes. But dingoes will also suffer in the drive against those pests. In New South Wales, the plan is to drop 1 million poisoned baits over vast swathes of burned and unburned bush in the coming year, as part of the biggest feral animal cull the state has seen. The state government's strategy says "strict approvals and evidence-based guidelines are in place to mitigate the risks to native

Bulletin Board

Curiosities

MAY. 08, 2020

species and domestic animals". But the target area includes known hotspots of pure dingoes, says Cairns.

This isn't just a conservation issue. Growing evidence indicates that by removing dingoes, entire ecosystems become unbalanced. Comparing conditions on either side of the dingo fence, Letnic has found that the absence of these predators is linked to a dramatic rise in shrubs that cause trouble for farmers. In other research he found that dingoes control the number of kangaroos, which has a positive effect at all ecological levels, right down to the health of the soil. Kangaroos compete with cattle for grass, so this could benefit farmers too. And there is some evidence that dingoes keep feral cats and foxes in check.

Ecological balance

The science is highly contested, however. "The potential ecological benefits of dingoes remain speculative," says Mifsud. Letnic believes the response to dingo management needs to be more nuanced. "Dingoes are of value; they are also a pest. They can be both," he says. However, he and other conservationists know it will be difficult to persuade people that dingoes should be preserved and encouraged to thrive. "We're talking about many generational legacies of this human-wildlife conflict – it's not going to disappear overnight," says ecologist Corey Bradshaw at Flinders University in Adelaide.

Newsome believes that what is needed is a positive story about dingoes – like the one told about wolves in Yellowstone. Their reintroduction 25 years ago has had a transformative effect on that park's ecosystem, increasing elk and deer populations, stabilising plant life and riverbanks, and boosting the economy by \$35 million annually through ecotourism. As a mid-size, highly adaptable canid, the dingo is more analogous to the coyote than the larger wolf. Nevertheless, Newsome believes dingoes could play a similar role in ecological restoration. He has even come up with a plan to test this idea. He proposes realigning the existing dingo-proof fence to reintroduce dingoes to an area of Sturt national park, in north-western New South Wales, and then documenting their role in ecological change. He predicts that foxes and cats would suffer, kangaroo numbers would be better regulated, vegetation would return and soil quality would improve. As a result, populations of native insects, reptiles, birds and mammals would bounce back. "I feel like that's a story that will help garner both ecological knowledge about the role of the dingo, but also what it can do if we were to stop controlling it," he says.

Bulletin Board

Curiosities

MAY. 08, 2020

When Newsome published a proposal for his idea in 2015, he acknowledged that it would be a challenge. He was right. The plan encountered resistance at state and federal government level, and nobody would finance it. "It's too politically charged," he says. "You can get lots of money to work on how to control dingoes. In terms of studying them for an ecological role, it's a bit harder."

Given the ecological damage done by last summer's fires, this seems like a missed opportunity. What's more, the ongoing eradication of dingoes may well be storing up trouble for the future. Bradshaw points out that Australia's mammalian extinction rate is the highest in the world, with 34 species lost in the past 250 years, at a steady rate of one to two per decade. It is perfectly plausible that the dingo could go the same way, he says, "probably not anytime soon, but we're not doing it any favours. And by proxy, we're not doing our already degraded environments many favours either."

Although attitudes are starting to change, there is clearly a long way to go. "There are a lot of dingo [proponents] around, but we get persecuted, because we speak up about them," says Ings. From high up on his mountain in dingo country, his view differs from many landowners. "There's no other native animal that has been so persecuted," he says. "It's wrong – especially given how important they are to the ecosystem."

[newscientist.com](https://www.newscientist.com), 22 April 2020

<https://www.newscientist.com>

Bulletin Board

Technical Notes

MAY. 08, 2020

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

CHEMICAL EFFECTS

ERK is involved in the differentiation and function of dimethyl sulfoxide-induced HL-60 neutrophil-like cells, which mimic inflammatory neutrophils

Quantitative structure activity relationship (QSAR) modelling of the degradability rate constant of volatile organic compounds (VOCs) by OH radicals in atmosphere

Indoor air partitioning of Synthetic Musk Compounds: Gas, particulate matter, house dust, and window film

RIFM fragrance ingredient safety assessment, 4H-1,3-benzodioxin, hexahydro-4-methyl-2-(phenylmethyl)-, CAS Registry Number 1373821-23-8

Removing critical gaps in chemical test methods by developing new assays for the identification of Thyroid Hormone System-Disrupting Chemicals—The ATHENA Project

ENVIRONMENTAL RESEARCH

Operational and structural A-stage improvements for high-rate carbon removal

Combined toxicity of imidacloprid and cadmium on histopathology and acetylcholinesterase activity in aquatic oligochaetes (*Tubifex tubifex* Müller, 1774)

Assessment of acetochlor use areas in the sahel region of Western Africa using geospatial methods

Sustainable and ecofriendly approach of managing soil born bacterium *Ralstonia solanacearum* (Smith) using dried powder of *Conyza canadensis*

Cigarette waste: Assessment of hazard to the environment and health in Riyadh city

PHARMACEUTICAL/TOXICOLOGY

A review of the drug-drug interactions of the antiepileptic drug brivaracetam

Bulletin Board

Technical Notes

MAY. 08, 2020

The association between urinary levels of 1,3-butadiene metabolites, cardiovascular risk factors, microparticles, and oxidative stress products in adolescents and young adults

Predictors with regard to ingestion, inhalation and dermal absorption of estimated phthalate daily intakes in pregnant women: The Barwon infant study

The selected epigenetic effects of aminomethylphosphonic acid, a primary metabolite of glyphosate on human peripheral blood mononuclear cells (in vitro)

Epidemiology of bacteria and viruses in the respiratory tract of humans and domestic pigs

OCCUPATIONAL

Occupational skin conditions on the frontline: A survey among 484 Chinese healthcare professionals caring for Covid-19 patients

Bone mineral density in population long-term exposed to rare earth elements from a mining area of China

Effects of ambient PM 2.5 and particle-bound metals on the healthy residents living near an electric arc furnace: A community-based study

Assessment of genetic effects and pesticide exposure of farmers in NW Greece

Elevated occupational exposure to chlorinated phosphate esters at a construction materials manufacturing plant