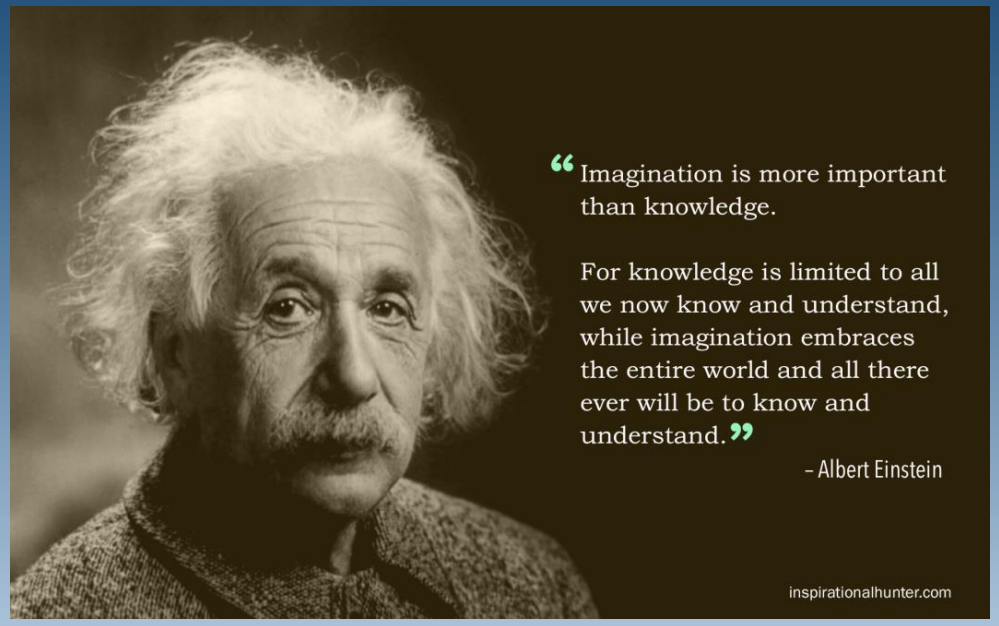
NHS
University Hospitals of Leicester
NHS Trust

UNIVERSITY OF LEICESTER



http://www.inspirationalhunter.com/albert-einstein-quote-imagination-is-more-important-than-knowledge/

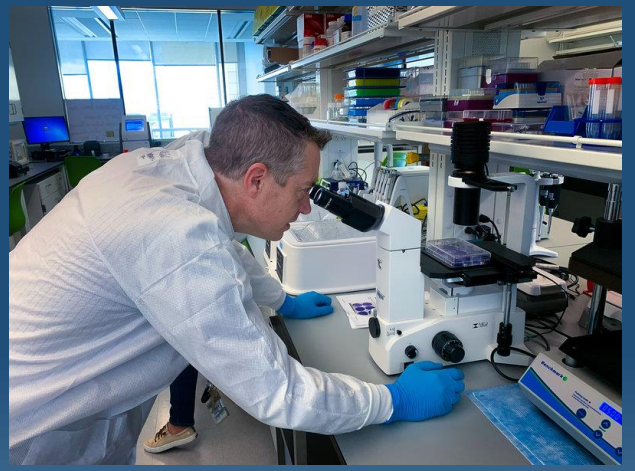
Viruses, physics, sci-fi and public health - mysteries and similarities

Dr Julian W Tang

Honorary Associate Professor/ Clinical Virologist

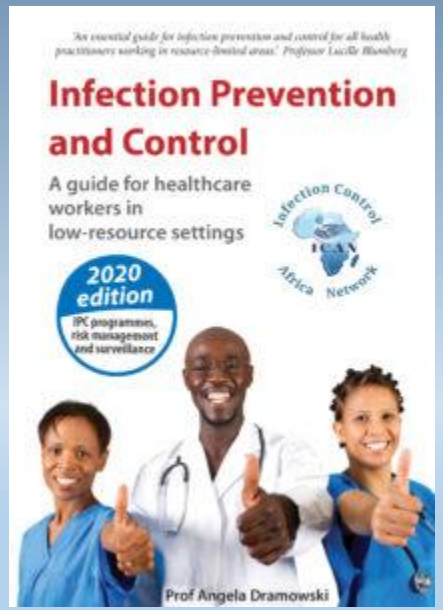
Respiratory Sciences, University of Leicester, Leicester, UK

https://dailyasianage.com/news/98772/female-engineers-behind-the-biggest-uk-construction



https://www.extraweird.com/virologists-has-determine-to-spend-their-days-in-the-lab-until-covid19-is-track-down-covid19/

“One of the amazing things to come out of the COVID-19 pandemic is the massive interdisciplinary collaboration between scientists – including virologists, engineers, epidemiologists, infectious diseases, public health and infection control”



http://bettercare.co.za/learning-programmes/infection-prevention-and-control/

https://www.forbes.com/sites/coronavirusfrontlines/2020/06/03/can-you-get-covid-19-twice-an-infectious-disease-doctor-explores-the-possibility/?sh=7ba3f51310c4

Never-before-seen microbes locked in glacier ice could spark a wave of new pandemics if released

https://www.livescience.com/hundreds-of-new-microbes-found-in-melting-glaciers

Giant new 50-metre deep 'crater' opens up in Arctic tundra

https://siberiantimes.com/other/others/news/giant-new-50-metre-deep-crater-opens-up-in-arctic-tundra/

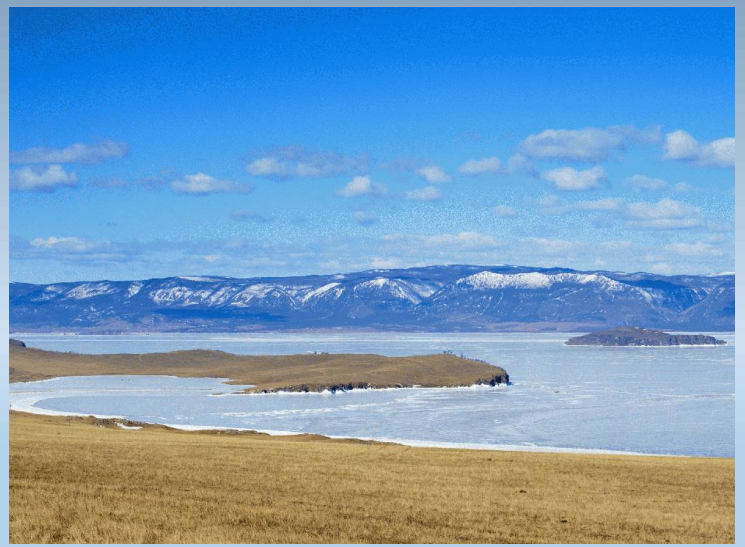
Climate physics and microbiology coming together – adding to other potential man-made disasters…

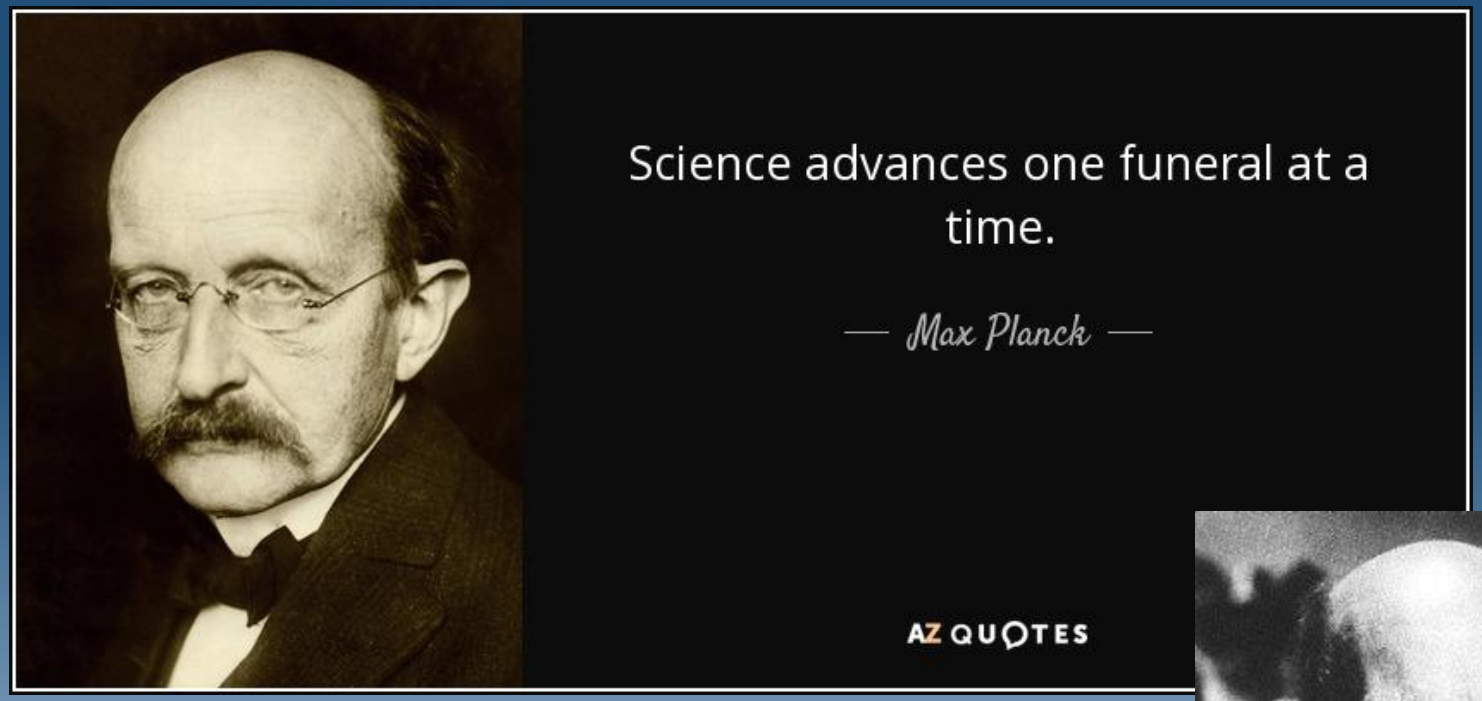
An outbreak of anthrax in Siberia killed thousands of reindeer in 2016.

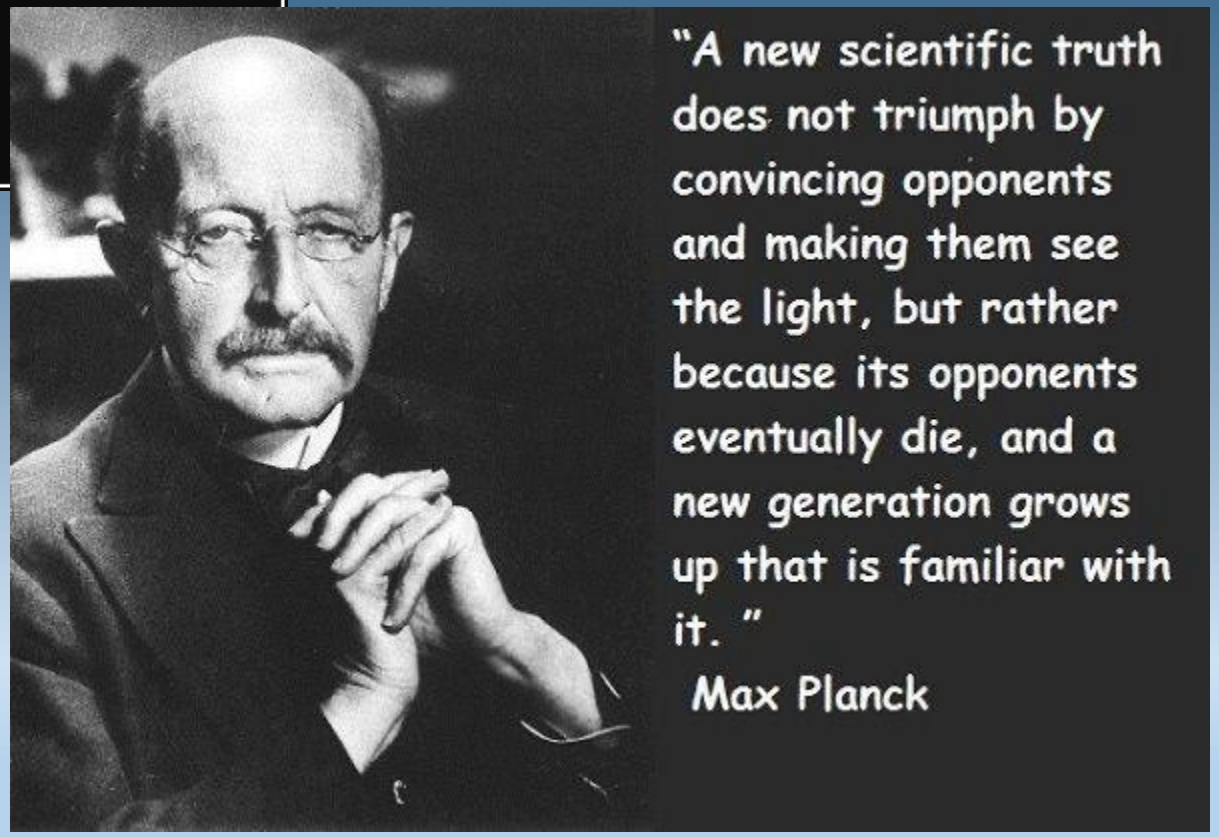
https://unearthed.greenpeace.org/2020/07/03/arctic-permafrost-pandemic-life-uh-finds-a-way/amp/

Smallpox could return as Siberia's melting permafrost exposes ancient graves

https://www.independent.co.uk/climate-change/news/smallpox-siberia-return-climate-change-global-warming-permafrost-melt-a7194466.html?amp







Quote from Max Planck

True in probably all scientific fields – as we are all human

https://www.youtube.com/watch?app=desktop&v=ROYL0OqKQqI

COVID-19 – aerosol transmission controversy – had a strong historical basis

nature

nature › news feature › article

NEWS FEATURE | 06 April 2022

Why the WHO took two years to say COVID is airborne

Early in the pandemic, the World Health Organization stated that SARS-CoV-2 was not transmitted through the air. That mistake and the prolonged process of correcting it sowed confusion and raises questions about what will happen in the next pandemic.

Dyani Lewis

https://www.nature.com/articles/d41586-022-00925-7

REVIEW

WILEY

What were the historical reasons for the resistance to recognizing airborne transmission during the COVID-19 pandemic?

Jose L. Jimenez[1] | Linsey C. Marr[2] | Katherine Randall[3] | Edward Thomas Ewing[4] | Zeynep Tufekci[5] | Trish Greenhalgh[6] | Raymond Tellier[7] | Julian W. Tang[8] | Yuguo Li[9] | Lidia Morawska[10] | Jonathan Mesiano-Crookston[11] | David Fisman[12] | Orla Hegarty[13] | Stephanie J. Dancer[14] | Philomena M. Bluyssen[15] | Giorgio Buonanno[16] | Marcel G. L. C. Loomans[17] | William P. Bahnfleth[18] | Maosheng Yao[19] | Chandra Sekhar[20] | Pawel Wargocki[21] | Arsen K. Melikov[21] | Kimberly A. Prather[22]

https://onlinelibrary.wiley.com/doi/epdf/10.1111/ina.13070

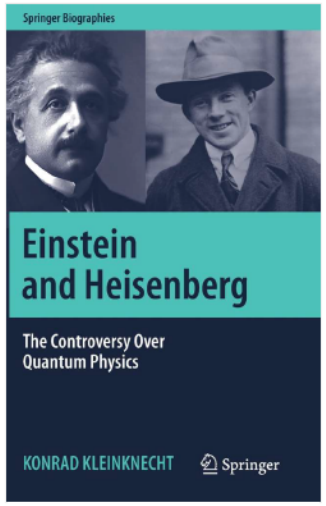
Historical and current controversies in physics

CERNCOURIER

Quantum Physics

21 March 2020

Einstein and Heisenberg: The Controversy over Quantum Physics, by Konrad Kleinknecht, Springer

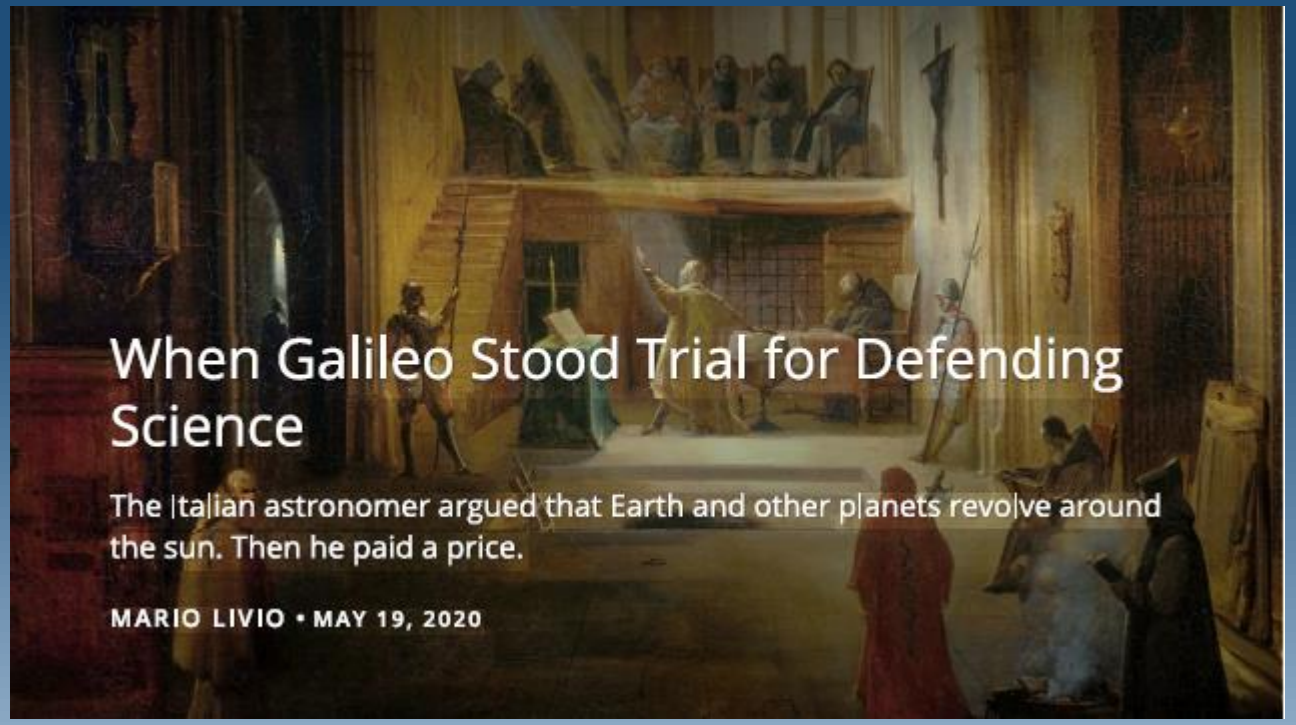


Credit: Springer

This attractive and exciting book gives easy access to the history of the two main pillars of modern physics of the first half of the 20th century: the theory of relativity and quantum mechanics. The history unfolds along the parallel biographies of the two giants in these fields, Albert Einstein and Werner Heisenberg. It is a fascinating read for everybody interested in the science and culture of their time.

At first sight, one could think that the author presents a twin biography of Einstein and Heisenberg, and that's all. However, one quickly realises that there is much more to this concise and richly illustrated text. Einstein and Heisenberg's lives are embedded in the context of their time, with emphasis given to

https://cerncourier.com/a/einstein-and-heisenberg-the-controversy-over-quantum-physics/



https://www.history.com/news/galileo-copernicus-earth-sun-heresy-church

Faster than light travel is possible, scientist claims

By Harry Pettit, The Sun

March 12, 2021 6:50pm Updated

https://nypost.com/2021/03/12/faster-than-light-travel-is-possible-scientist-claims/

The cosmologist who claims to have evidence for the multiverse

Cosmologist Laura Mersini-Houghton says our universe is one of many – and she argues that we have already seen signs of those other universes in the cosmic microwave background, the light left over from the big bang

This article has been viewed 576 times in the last 24 hours.

PHYSICS 31 October 2022

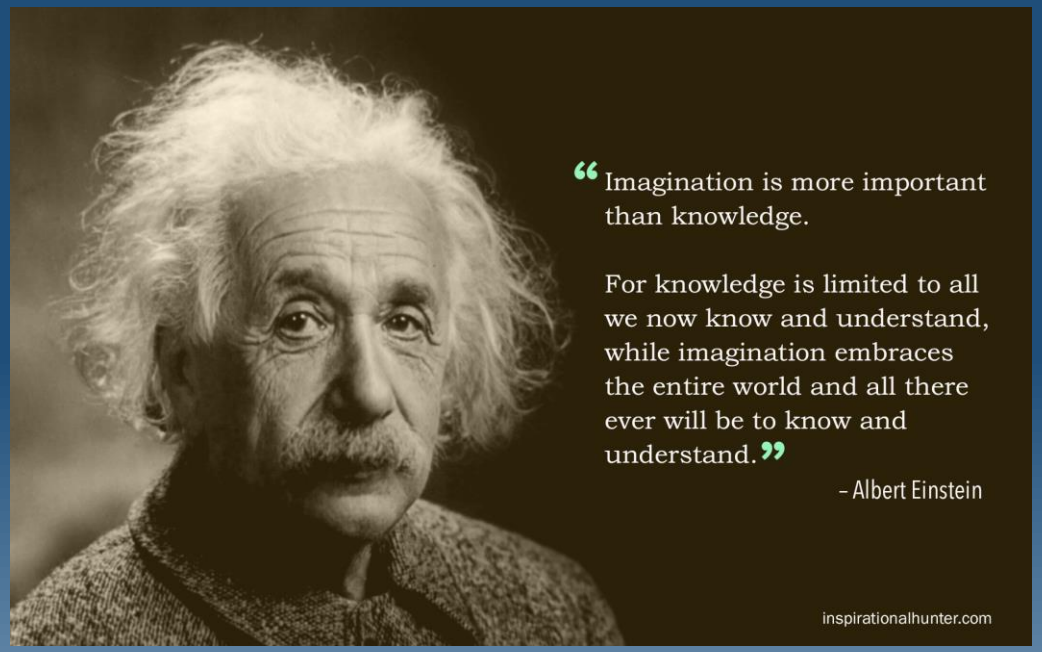
By Rowan Hooper

https://www.newscientist.com/article/0-the-cosmologist-who-claims-to-have-evidence-for-the-multiverse/#:~:text=HOW%20did%20our%20universe%20begin,says%20she%20has%20cracked%20it.

https://scifi.stackexchange.com/questions/111585/what-are-all-the-known-lightsaber-designs

https://es.fanpop.com/clubs/resident-evil-extinction/images/40187900/title/resident-evil-extinction-zombies-photo

https://www.huffpost.com/entry/star-trek-phaser-auction_n_3033568

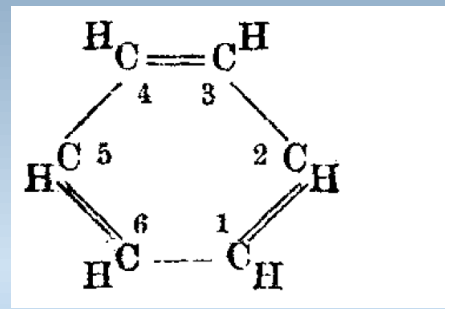


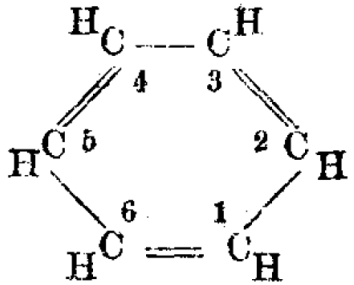
http://www.inspirationalhunter.com/albert-einstein-quote-imagination-is-more-important-than-knowledge/

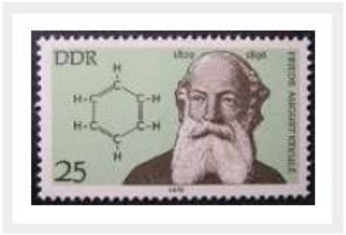
Image and Reality: Kekulé, Kopp, and the Scientific Imagination

Alan J. Rocke

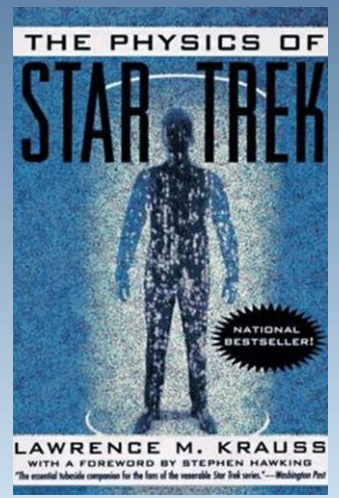
University of Chicago Press: 2010. 416 pp. $45, £29 9780226723327 | ISBN: 978-0-2267-2332-7

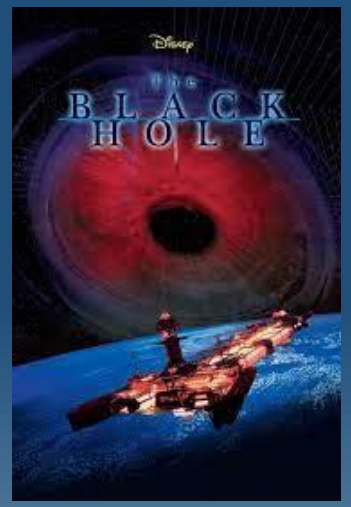


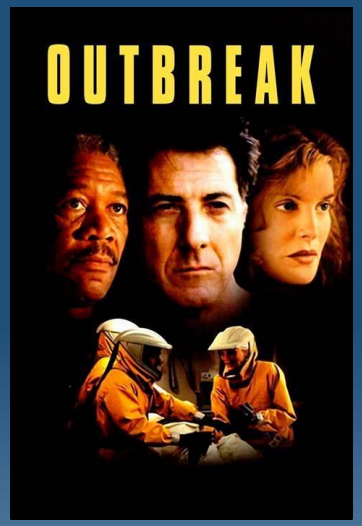




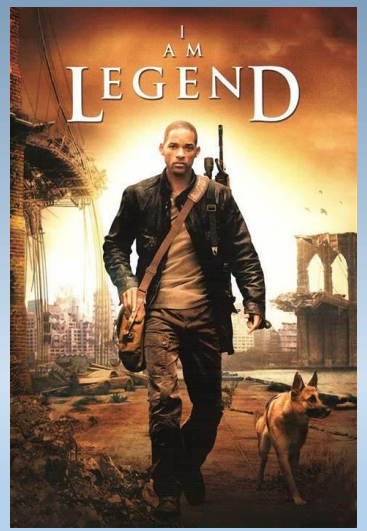
German chemist August Kekulé visualized the ring structure of benzene in 1865.







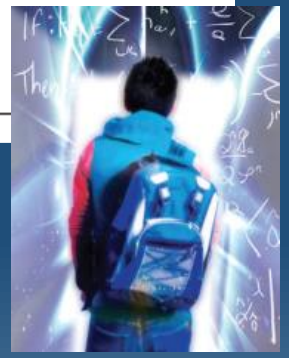
Both physics and virology have had their fair share of Hollywood movies!



Rejuvenation

The chase is on.

Julian Tang



From Mars with love

He who dares ...

Julian Tang

"So children, what would you like to hear about today?"

The Old-Timer smiled down, benignly, at the 30-odd youngsters sitting cross-legged in front of him on the purple Martian grass.

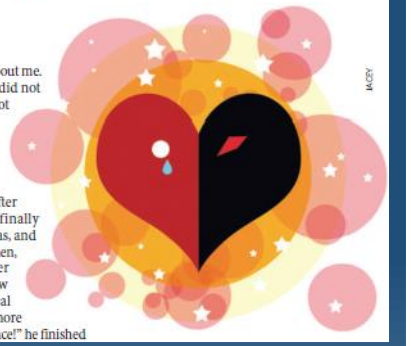
"A story!" they yelled in unison, giggling and rocking about on their bottoms, knocking each other over.

The Old-Timer also started to laugh, but quickly stopped himself as he started to cough and splutter. With the weaker Martian gravity and greater distance from the Sun, the human colonists on Mars had increased their average life span to about

something different about me. My wife said that she did not know me. Even I did not know who I was."

"What happened then?" asked the cheeky boy, curiously.

"Well, eventually, after about six months, I finally remembered who I was, and everything was OK. Then, I had to train other astronauts about how to return to a normal life on Earth — after more than a year alone in space!" he finished



ESP

Breakfast with the enemy.

BY JULIAN TANG

The interrogation room was a disgrace. Its once shiny titanium walls and floor were stained with patches of unidentifiable dried goo. Commander Maurice Gilet sat to one side, waiting. A loud clattering and the thud of heavy equipment announced the arrival of the prisoner outside the room's entrance.

The door opened and Maurice's old friend, head prison guard Bernard Marchand, entered carrying an e-clipboard. "Prisoner AX-5777, as requested, Sir. Just transferred from holding at the Virgin leisure colony on Maldives-592."

"Thanks, Bernard — you can drop the 'Sir'," he grinned, weakly. It had been a long week. "This is our prime suspect in the Virgin cruiser explosion?"

"Yes, but you've not interviewed one of these before, have you? They're totally aquatic, so the translation unit has given it a human voice — you'll approve, I think." He gave a wink and backed out of the room.

Maurice walked round the large, cylindrical water tank that held his captive. He stared at the contents curiously, and not without some amusement. The prisoner looked

adapted survival capsule. Nothing else survived the explosion. We want to know what happened and if, and how, you were responsible. Many people died in this explosion, so if you refuse to cooperate fully, things may become ... unpleasant."

Her seductive demeanour changed abruptly. "Commander, you are not in any position to caution me," she began in a tone of suppressed rage. "Your species has invaded our ecosphere purely for pleasure. The fact that the only intelligent life forms there are aquatic still does not permit the effluent from your 'terrestrial pleasure farms' to pollute our waters. Besides, you should be thanking me."

Maurice sighed and took the bait. "And why should we be doing that? Is this some sort of confession?"

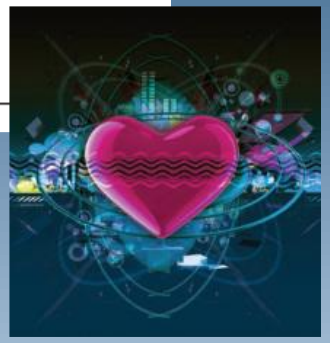
She looked at him with an amused smile.

Space/time travel, parallel dimensions, ETs, wormhole, telepathy, superpowers, etc.

Distraction

A fine romance.

Julian Tang



A smooth hero

Dancing machine.

Julian Tang

The scie... first floor...

Fetalogue

Early learning.

Julian Tang

Dr Kramer was ecstatic: a simple device (earphones included) worn on a belt over a pregnant woman's growing bump that converted the brain impulses of the developing fetus into its first, audible thoughts. Which mother-to-be would not want one?

Initial, small-scale trials had been very promising. True, the 'thoughts' were very basic, single-word utterances such as "hungry", "tired" or "noisy". Dr Kramer expected nothing else from a fetus with no experience of language. That the device worked so well was enough for him to expand the trial to 100 women.

He was sitting at his desk in his hospital office, reading through the fetal diaries of his trial participants, all of whom had faithfully recorded the daily thoughts of their fetus for the past month. He was about to close the folder, when he noticed something odd about one of the newer diaries. It was bulkier than the others but stopped about a

"Can

Codename: Phoenix

Here comes the rain.

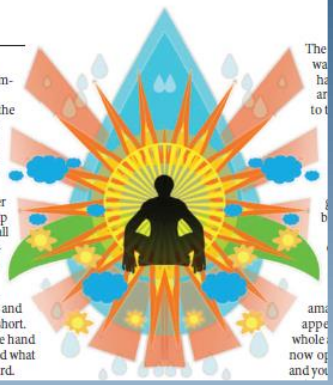
Julian Tang

It was blisteringly hot. The air shimmered above the desert sand.

The UN secretary-general and the country's leader stood just inside a large, battered, corrugated metal hangar. Their respective, air-conditioned limousines were parked farther inside.

They watched as a small propeller plane landed on the short airstrip outside. A young woman and a small boy, holding her hand, came carefully down the steps, out on to the hot sand.

The woman was dressed in a one-piece, white, sleeveless cotton dress and sandals. Her dark hair was cropped short. She looked sad and resigned. In the hand not holding onto the boy, she carried what looked like a large, square skateboard.



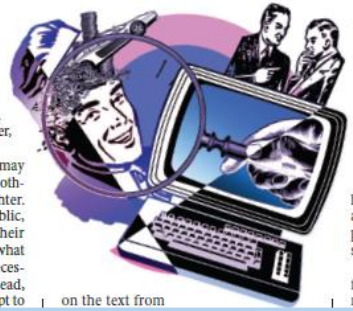
SURVEILLANCE

The word on the street.

BY JULIAN TANG

"The problem with running a country of 80 million people is that it's difficult to know what people are thinking — I mean, really thinking," said the Prime Minister, thoughtfully.

Henry Irvin cleared his throat. "If I may make a suggestion, Sir?" he started, smoothing his tie and sitting up a little straighter. "We know that what people say in public, particularly when asked to express their views specifically, may not represent what they really think or feel. This is not necessarily a deliberate intent to lie or mislead, but, more often than not, it is an attempt to



on the text from

Expatriate

Contact has been made.

Julian Tang

Roy Gredenski grinned as his rookies roared with laughter at his latest tale. He was celebrating his thirtieth year in the Customs and Immigration Department.

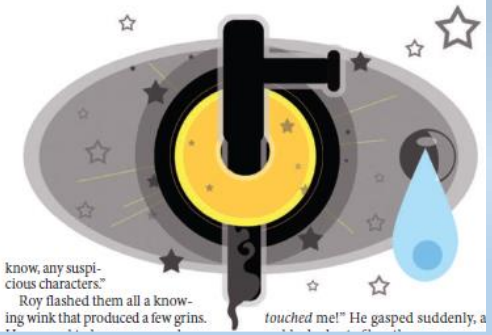
"Roy, do you have any other stories for the youngsters?" grinned his captain, Joe Werner, from the back of the room, where his other senior colleagues were sitting. They'd heard them all before but the tales only seemed to get better with each retelling.

Roy paused, looking around at the young, eager faces surrounding him.

know, any suspicious characters."

Roy flashed them all a knowing wink that produced a few grins.

touched me!" He gasped suddenly, a



I've also tried my hand at sci-fi – but none about viruses!

IRC

A helping hand.

Julian Tang

So you've heard of a rattlesnake wormhole, right?

Josh watched the words appear in his chat window, and had absolutely no idea what AstralBoy was talking about.

You know what a rattlesnake is, yes?

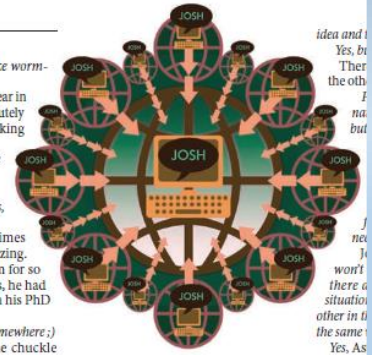
Yes, of course.

You know what a wormhole is, I presume?

Josh rolled his eyes. Sometimes AstralBoy could be so patronizing. Josh had only put up with him for so long because, whoever he was, he had given him a lot of insight with his PhD thesis.

OK then, now we're getting somewhere ;)

Josh could almost hear the chuckle



British Columbia CDC Vancouver, Canada (formerly)

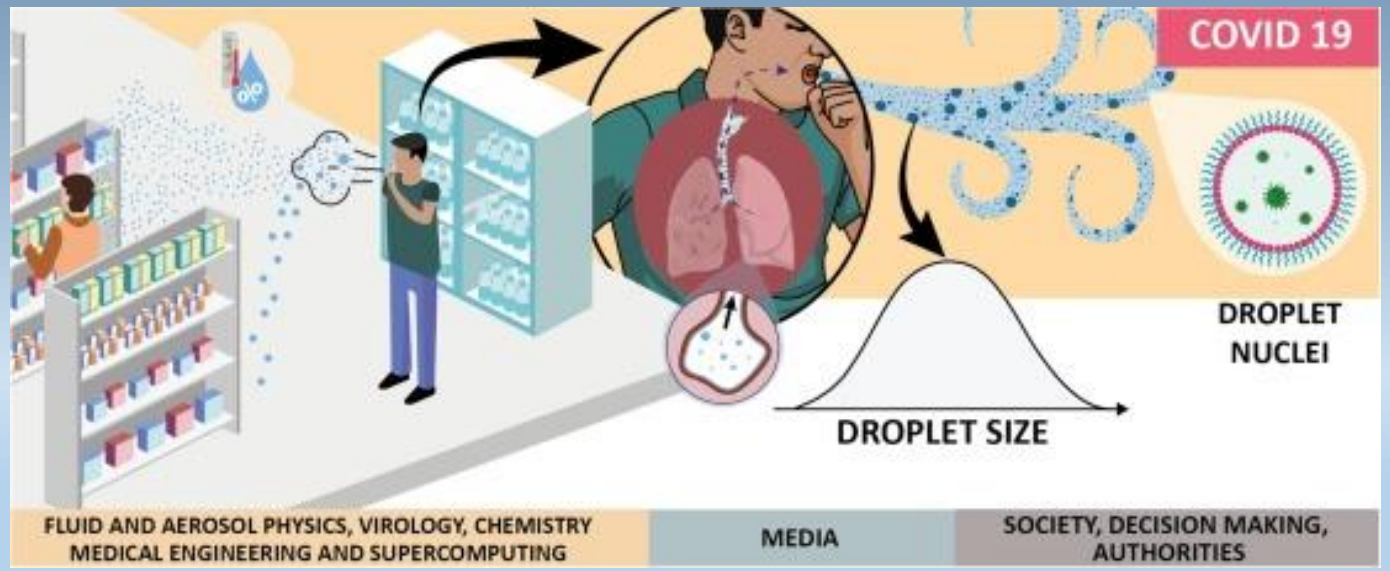
http://www.bridge.ubc.ca/faculty/babak-pourbohloul.html

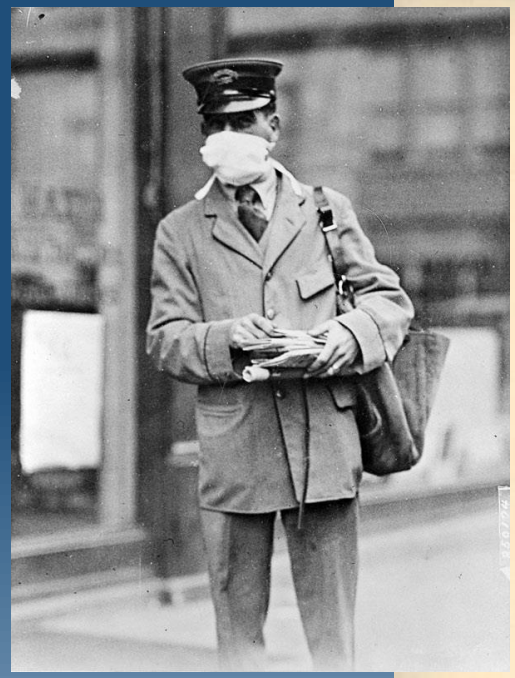
McGill University, Montreal, Canada (currently)

https://studiocast.ca/client/fmsq/event/7645/fr/

Former physicists, turned virologists or public health epidemiologists – useful interdisciplinary skills for COVID-19…

https://www.sciencedirect.com/science/article/pii/S0925753520302630#f0005





Over 300 million deaths from bubonic plague, flu, smallpox and HIV/AIDS, alone

N O T I C E .

Owing to [illegible]ed cases of Spanish Influenza on the reservation every one is cautioned to take every care that they do not expose themselves or their neighbors.

And to observe the following rules:

Do not collect in a crowd any place.

Women and children remain at home. Stay in the open air and sunshine.

Keep the home aired out.

Have plenty of fresh air when you sleep.

In case of storm keep dry and do not expose yourselves.

Do not mingle with others more than is necessary.

Do not go near whene any one is sick or where a white flag is flying.

Do not go to the store unless it is necessary. If you have to go tb the store or office your wants will be attended to on the porches.

If you get sick go to bed, in a tent is best, and notify the doctor at once. Lie down flat on your back and stay there.

Only one person in the family should go near the sick person.

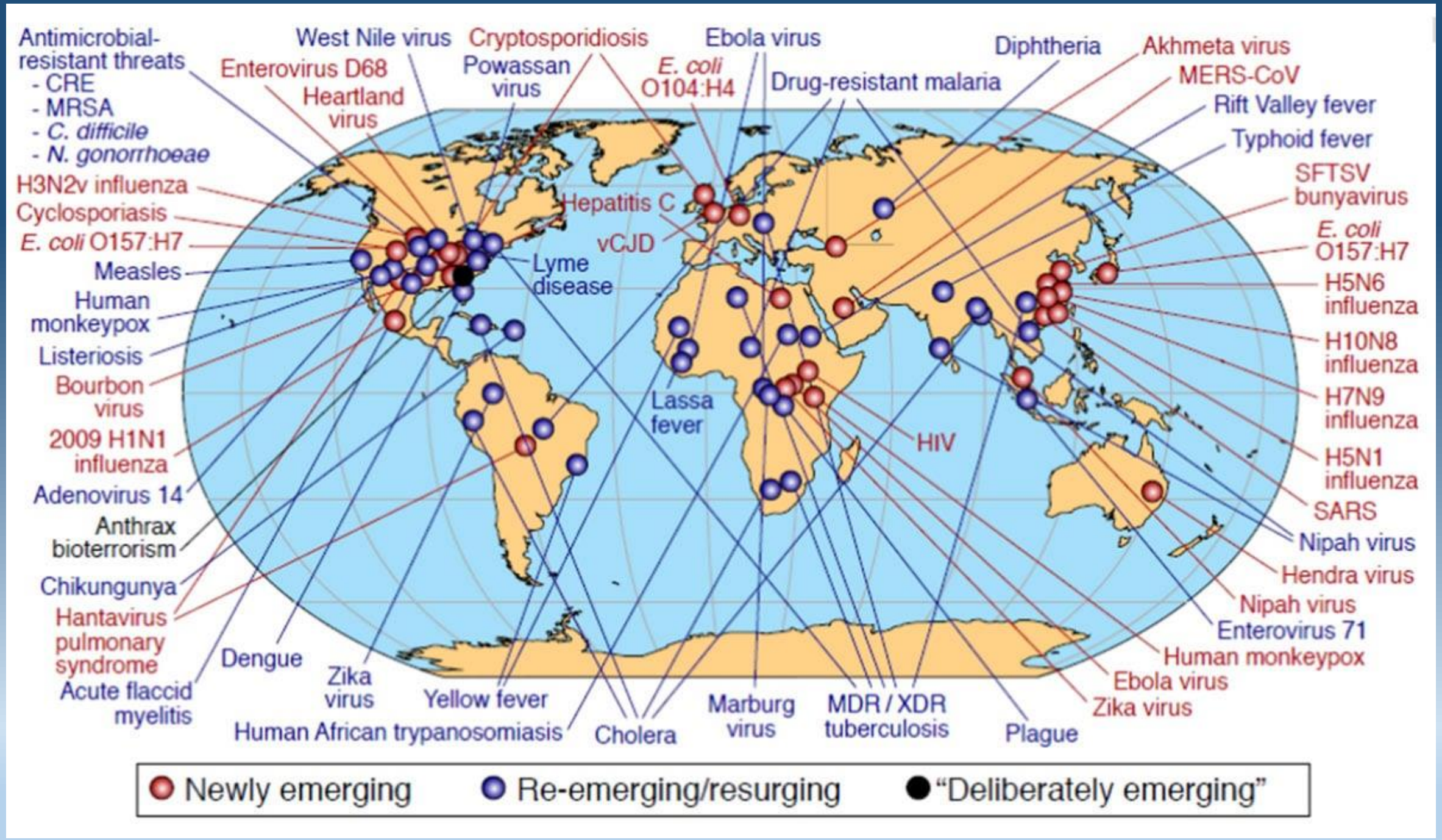
Every one help the Superintendent and Doctor all they can by following these instructions and they will do all they can for you.

H D Lawshe

Superintendent.

https://www.archives.gov/exhibits/influenza-epidemic/records-list.html

https://www.visualcapitalist.com/history-of-pandemics-deadliest/



https://extra.ie/2019/09/18/news/flu-like-illness-36-hours

https://www.ibtimes.co.uk/rare-disease-day-2016-10-rarest-conditions-world-1546263 **(ZIKA)**

https://www.thecut.com/2014/10/strange-polio-like-illness-is-paralyzing-kids.html **(polio/EVD68)**

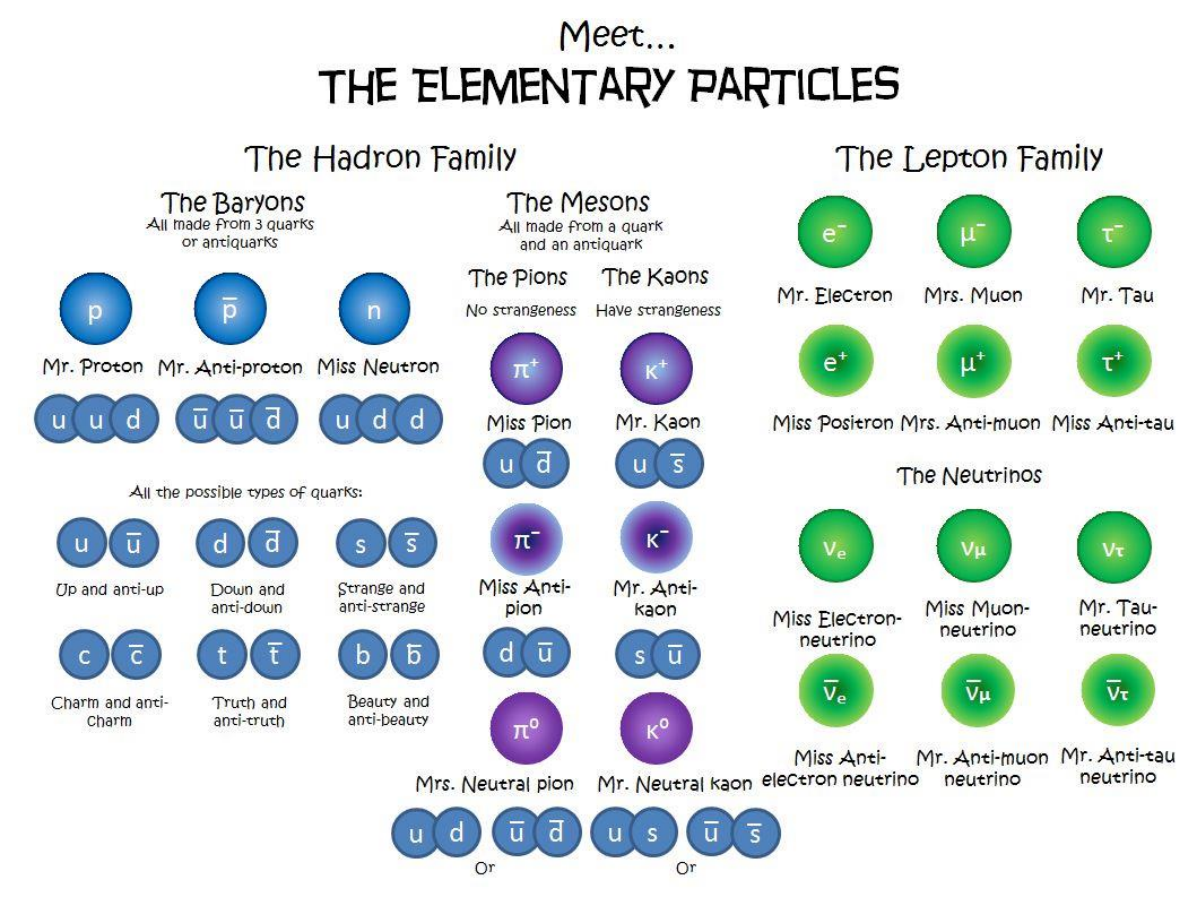
https://www.babycenter.com/health/illness-and-infection/measles_1417820 **(measles)**

https://www.acsh.org/news/2017/01/11/headlines-suggest-tree-man-syndrome-curable-10711 **(HPV - Epidermodysplasia verruciformis)**

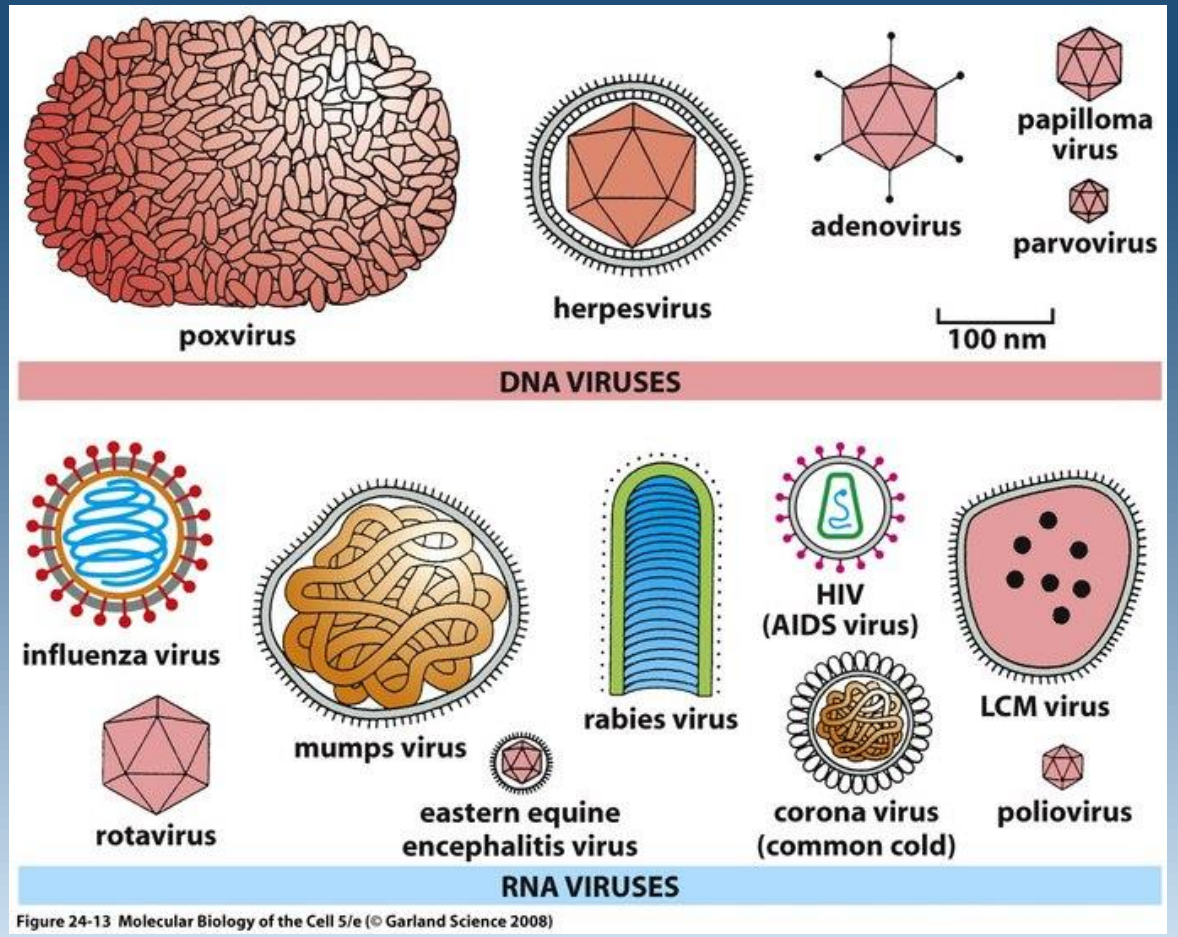
https://www.thelancet.com/journals/laninf/article/PIIS1473-3099(02)00263-3/fulltext?version=printerFriendly **(HIV/HHV8)**

https://journals.healio.com/doi/10.3928/00904481-20150512-11 **(cCMV)**

And particle physics and virology have their own – very similar looking – classification systems



https://www.phyzarre.com/super-kamiokande.html

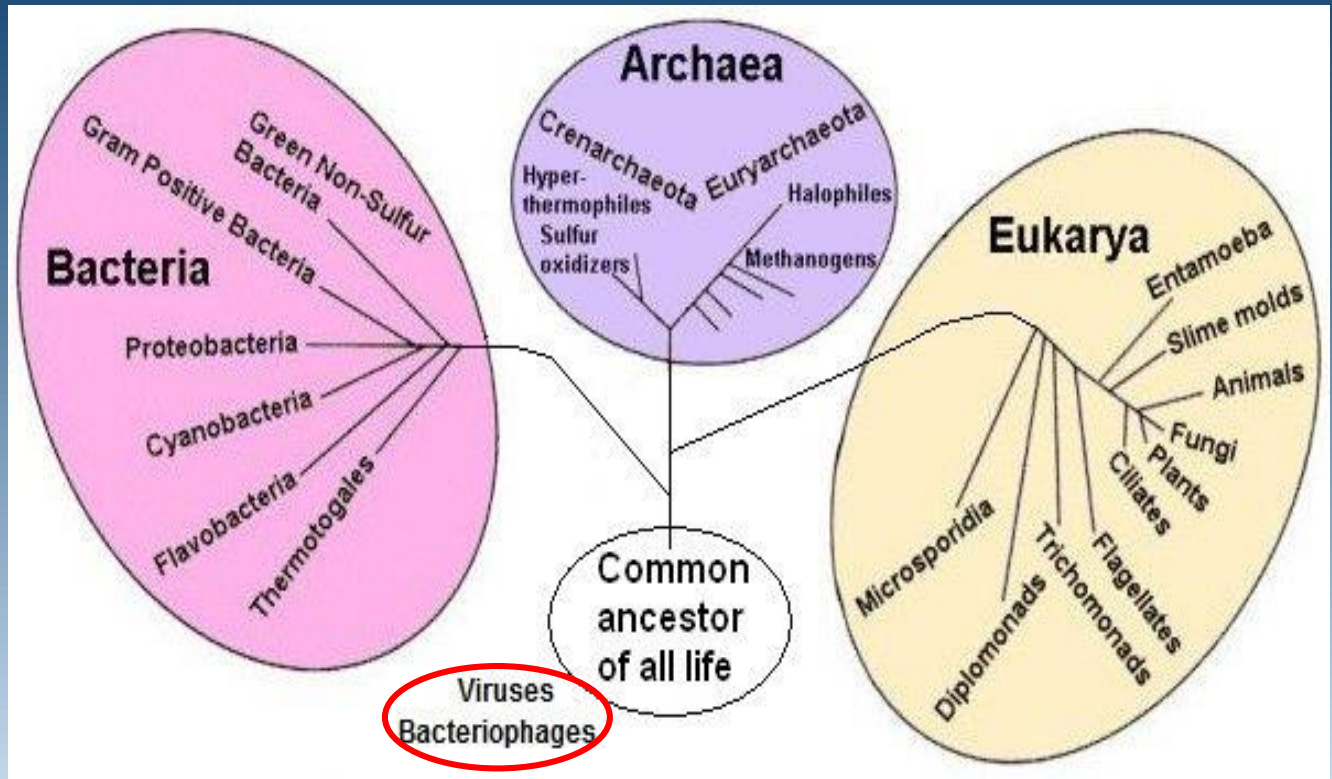


https://personalpages.manchester.ac.uk/staff/j.gough/lectures/TIB/4pathogens1/page4.html

Are viruses alive? Some say no because:

- Viruses are polyphyletic
- There are no ancestral viral lineages
- Because today's viruses infect phylogenetically distant hosts doesn't mean that they are ancient
- Viruses don't have a structure derived from a common ancestor
- Viral metabolic genes originate from cells
- Viral translation genes originate from cells
- Viruses steal genes from cells
- Most gene transfer goes from viruses to cells
- Just because viruses are simple doesn't mean that they are old

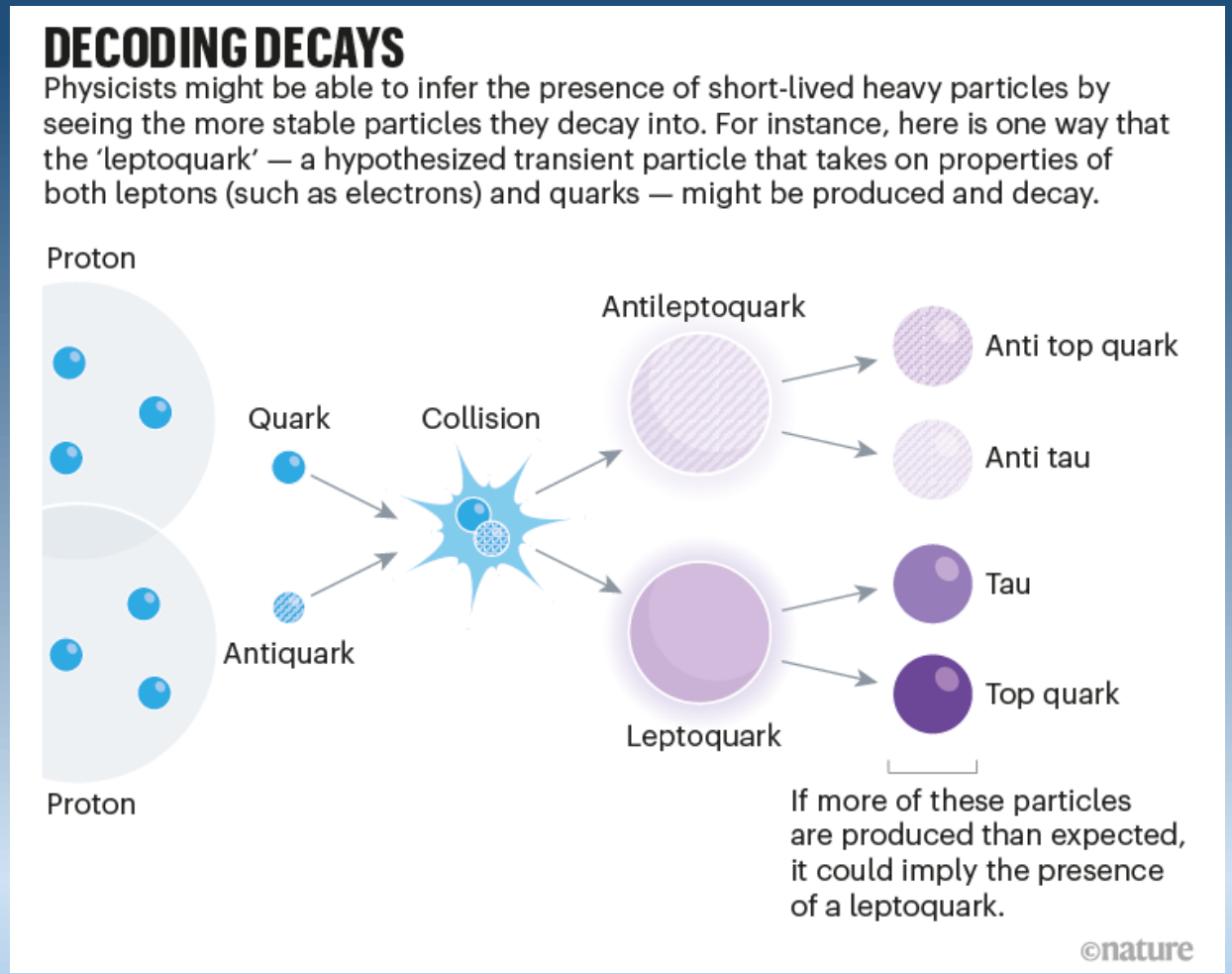
Even though viruses are not living and should not be included in the tree of life, they play an important role in evolution of their cellular hosts by regulating population and biodiversity.



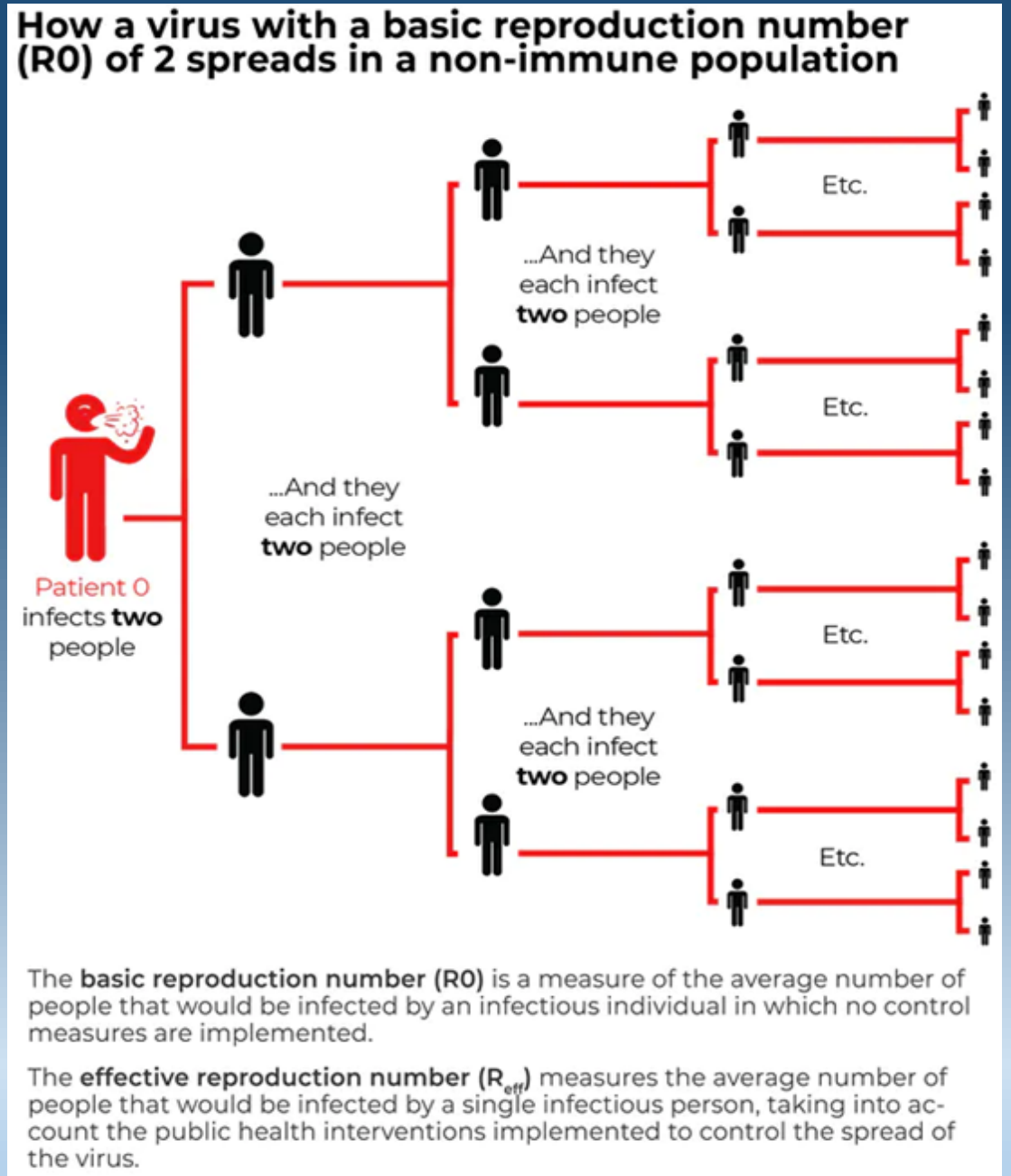
https://www.scientificpsychic.com/etc/timeline/phylogeny.html

https://www.virology.ws/2009/03/19/viruses-and-the-tree-of-life/

Tracking collision or transmission events?

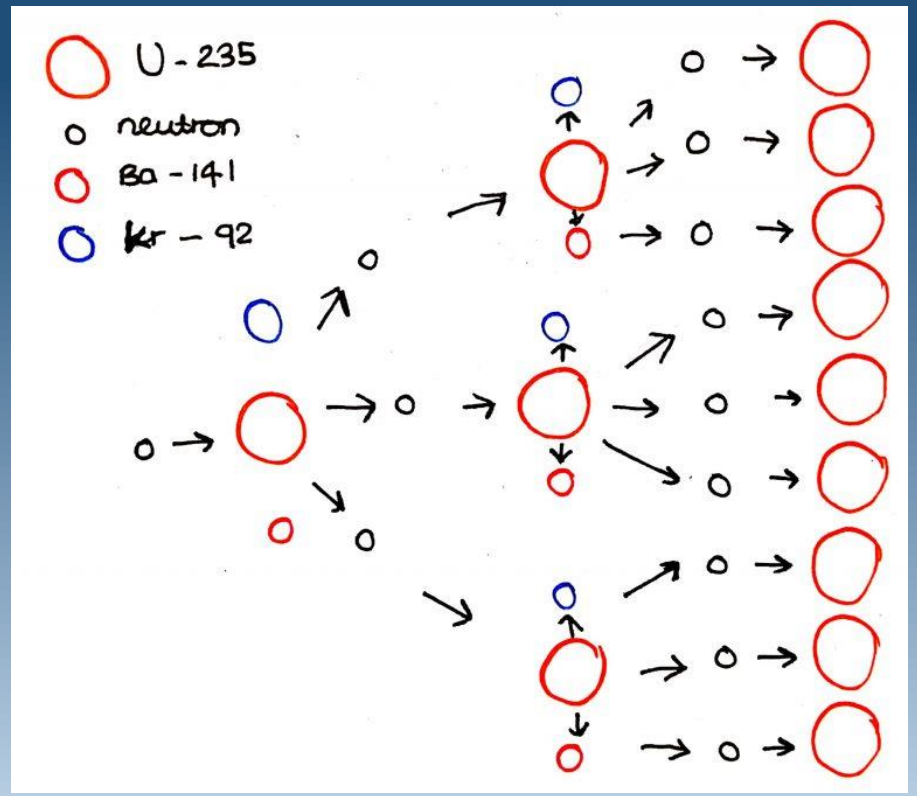


https://www.nature.com/articles/d41586-022-01388-6



https://theconversation.com/r0-how-scientists-quantify-the-intensity-of-an-outbreak-like-coronavirus-and-predict-the-pandemics-spread-130777

Deliberate vs. accidental collisions – or transmissions?

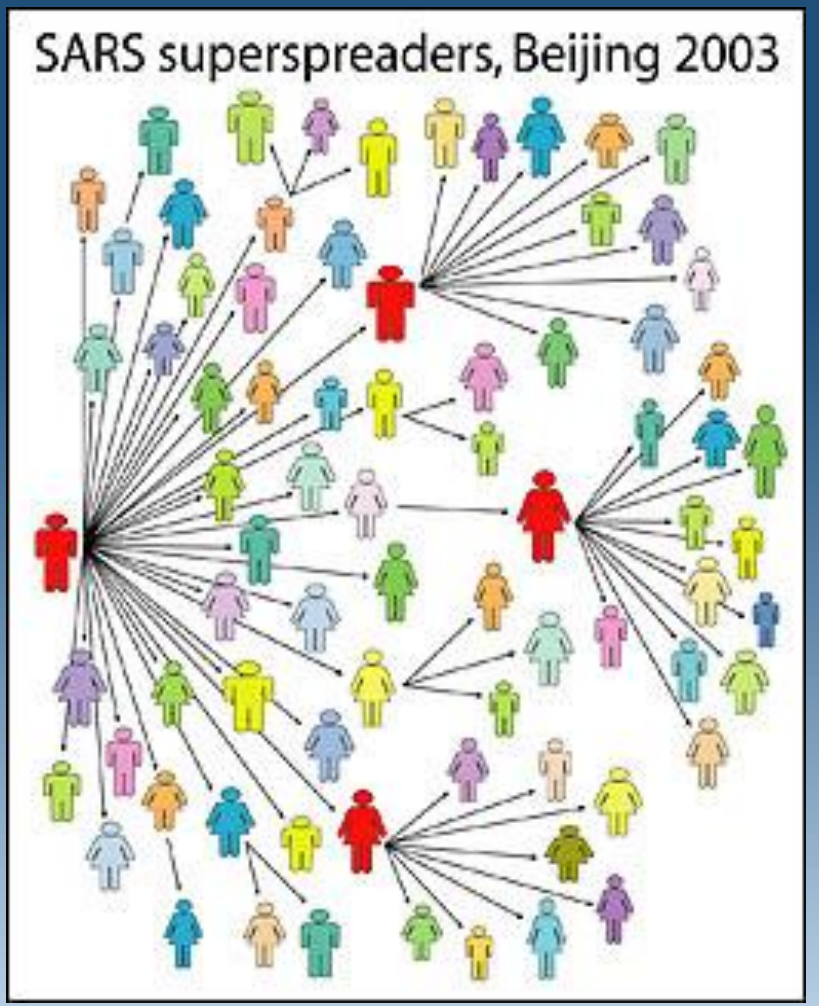


https://www.scienceandmathsrevision.co.uk/topic/nuclear-fission-and-fusion/

Boron rods slow down a nuclear (fission) reaction

https://www.gov.uk/government/news/new-measures-to-secure-mmr-vaccine-for-private-patients

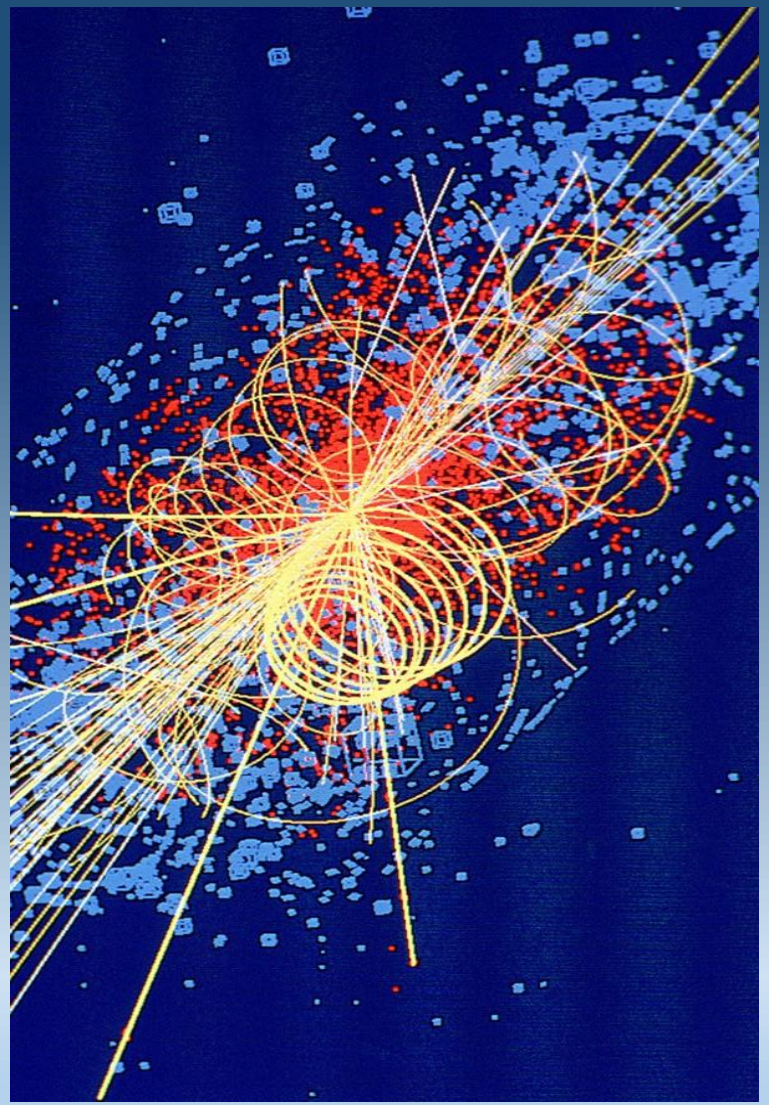
https://www.snopes.com/fact-check/flu-vaccine-covid-buttar/



https://www.berkeley.edu/news/media/releases/2005/11/16_super.shtml

Vaccines slow down viral transmission

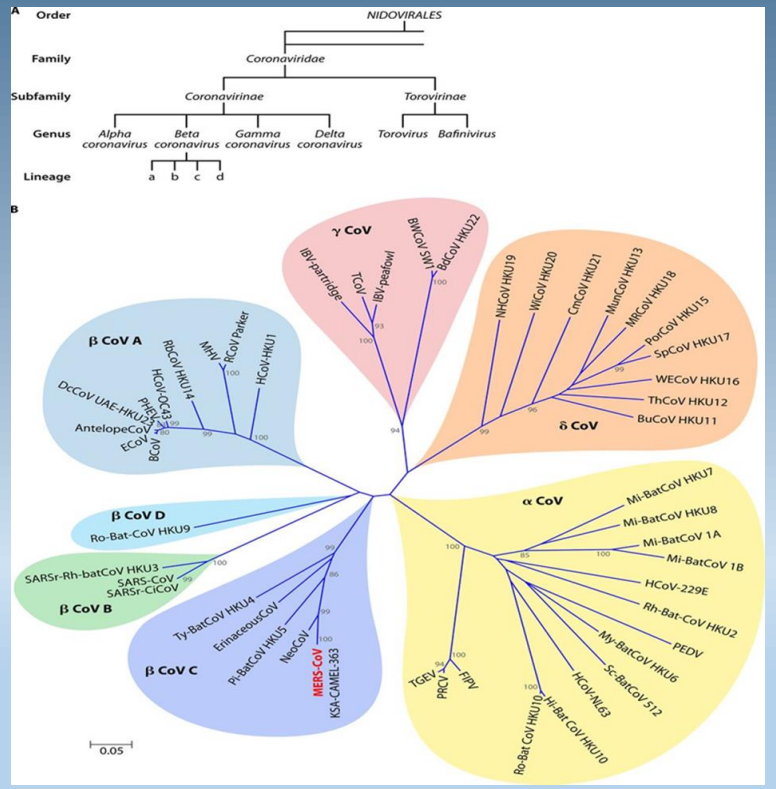
Tools to track/visualise particle or virus ‘collisions/events’



https://towardsdatascience.com/particle-tracking-at-cern-with-machine-learning-4cb6b255613c

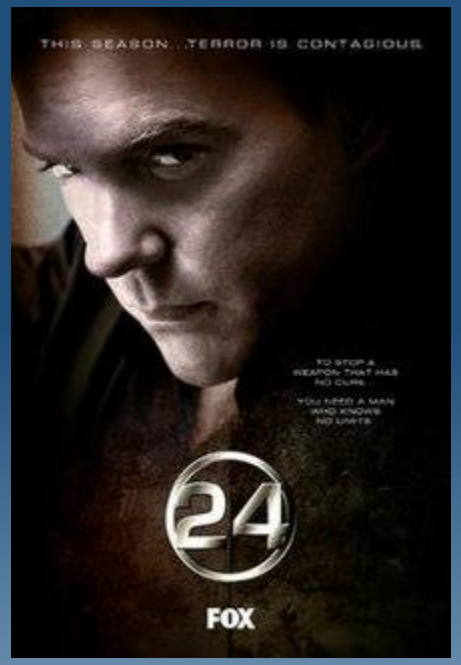
TRACK SPREAD of ZIKA VIRUS in USA & WORLDWIDE | 31 CASES IN USA

https://sciencevibe.com/2016/08/04/track-spread-of-zika-virus-in-usa-worldwide-31-cases-in-usa/



Viral phylogenetic tree and sequence analysis

https://pubmed.ncbi.nlm.nih.gov/25810418/



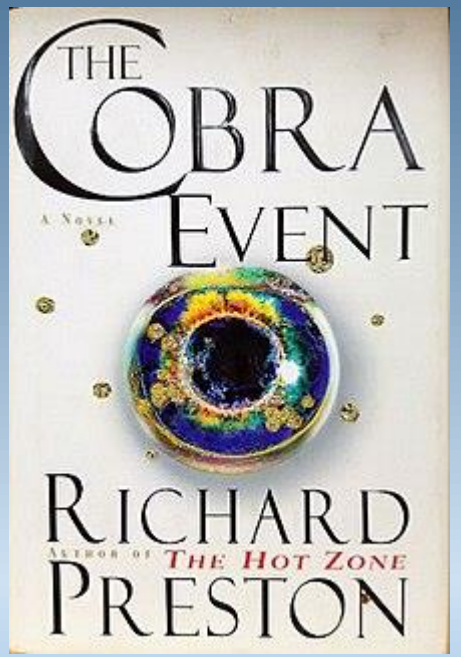
Season 3's main plot follows Jack Bauer's attempts to retrieve a deadly virus from terrorists in Mexico.

https://en.wikipedia.org/wiki/24_(season_3)

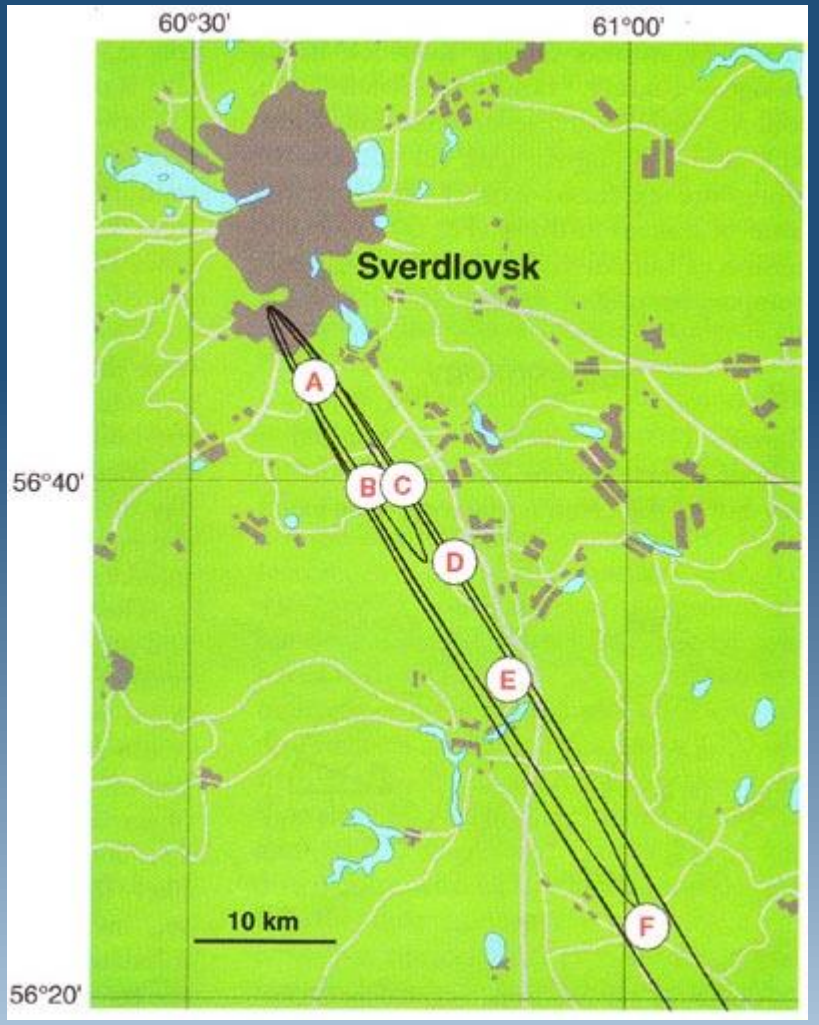
In Mission: Impossible 2, Ethan Hunt leads a mission to retrieve a deadly virus before it is released by terrorists. At one point, his girlfriend injects herself with the virus and is released into a city population to spread the virus further – unless Ethan can inject her with the antidote in time

https://en.wikipedia.org/wiki/Mission:_Impossible_2

Thinking more about virus transmission events…



https://en.wikipedia.org/wiki/The_Cobra_Event



https://www.ph.ucla.edu/epi/bioter/sverd/sverd_fig3_a.html

https://www.science.org/content/article/anthrax-genome-reveals-secrets-about-soviet-bioweapons-accident

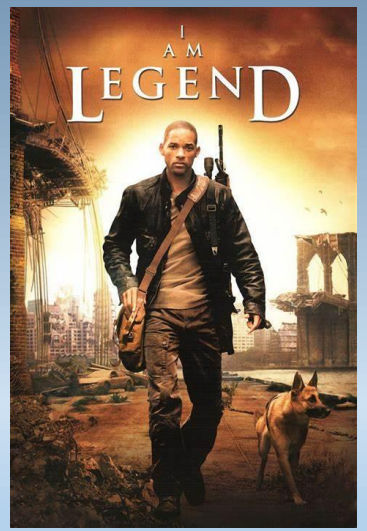
Alice is a former security specialist and covert operative who battles the Umbrella Corporation, whose bioweapons have triggered a zombie apocalypse.

https://en.wikipedia.org/wiki/Resident_Evil_(film_series)

https://en.wikipedia.org/wiki/Ken_Alibek

https://www.amazon.com/biohazard-ken-alibek-ebook/dp/b0031rs5di

During his career as a Soviet bioweaponeer, in the late 1970s and 1980s, Alibekov managed projects that included weaponizing glanders and Marburg hemorrhagic fever, and created Russia's first tularemia bomb. His most prominent accomplishment was the creation of a new "battle strain" of anthrax, known as "Strain 836", later described by the Los Angeles Times as "the most virulent and vicious strain of anthrax known to man".



An attempt to genetically re-engineer the measles virus to cure cancer becomes lethal, infecting 99% of the world's population, turning those it does not kill into vampiric, albino, cannibalistic mutants called Darkseekers

https://en.wikipedia.org/wiki/I_Am_Legend_(film)

Future Oncol. 2010 April ; 6(4): 619–634. doi:10.2217/fon.10.18.

Oncolytic herpes simplex virus vectors and chemotherapy: are combinatorial strategies more effective for cancer?

Ryuichi Kanai, MD, PhD,
Brain Tumor Research Center, Department of Neurosurgery, Massachusetts General Hospital, & Harvard Medical School, Boston, MA, USA

Curr Gene Ther. 2013 December ; 13(6): 421–433.

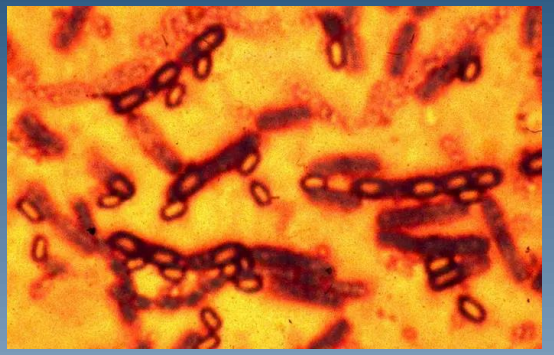
Adenovirus Vectors for Gene Therapy, Vaccination and Cancer Gene Therapy

William S.M. Wold[1,*] and **Karoly Toth**[1]
[1]Saint Louis University School of Medicine, Department of Molecular Microbiology & Immunology, St. Louis, MO, USA

Between 1949 and 1969, open-air tests of biological agents were conducted 239 times:

- In the 1950s, army researchers dispersed *Serratia* on Panama City and Key West Florida with no known illnesses resulting.
- ***Bacillus globigii*, never shown to be harmful to people, was released in San Francisco, New York, Washington, D.C., and along the Pennsylvania Turnpike, among other places.**
- **In New York, military researchers in 1966 spread *Bacillus subtilis* variant *Niger*, also believed to be harmless, in the subway system by dropping lightbulbs filled with the bacteria onto tracks in stations in midtown Manhattan. The bacteria were carried for miles throughout the subway system. Army officials concluded in a January 1968 report that: "Similar covert attacks with a pathogenic disease-causing agent during peak traffic periods could be expected to expose large numbers of people to infection and subsequent illness or death."**
- In a May 1965 secret release of *Bacillus globigii* at Washington's National Airport and its Greyhound Lines bus terminal, more than 130 passengers were exposed to the bacteria and traveled to 39 cities in seven states in the two weeks following the mock attack

https://en.wikipedia.org/wiki/Operation_Sea-Spray



https://www.businessinsider.com/biological-agents-were-tested-on-the-new-york-city-subway-2015-11?r=US&IR=T

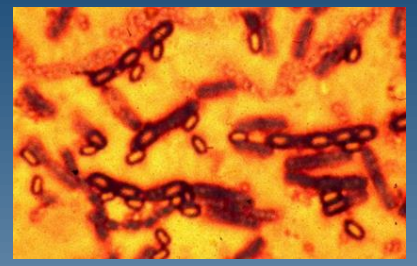
More blurring of science fact and science fiction….

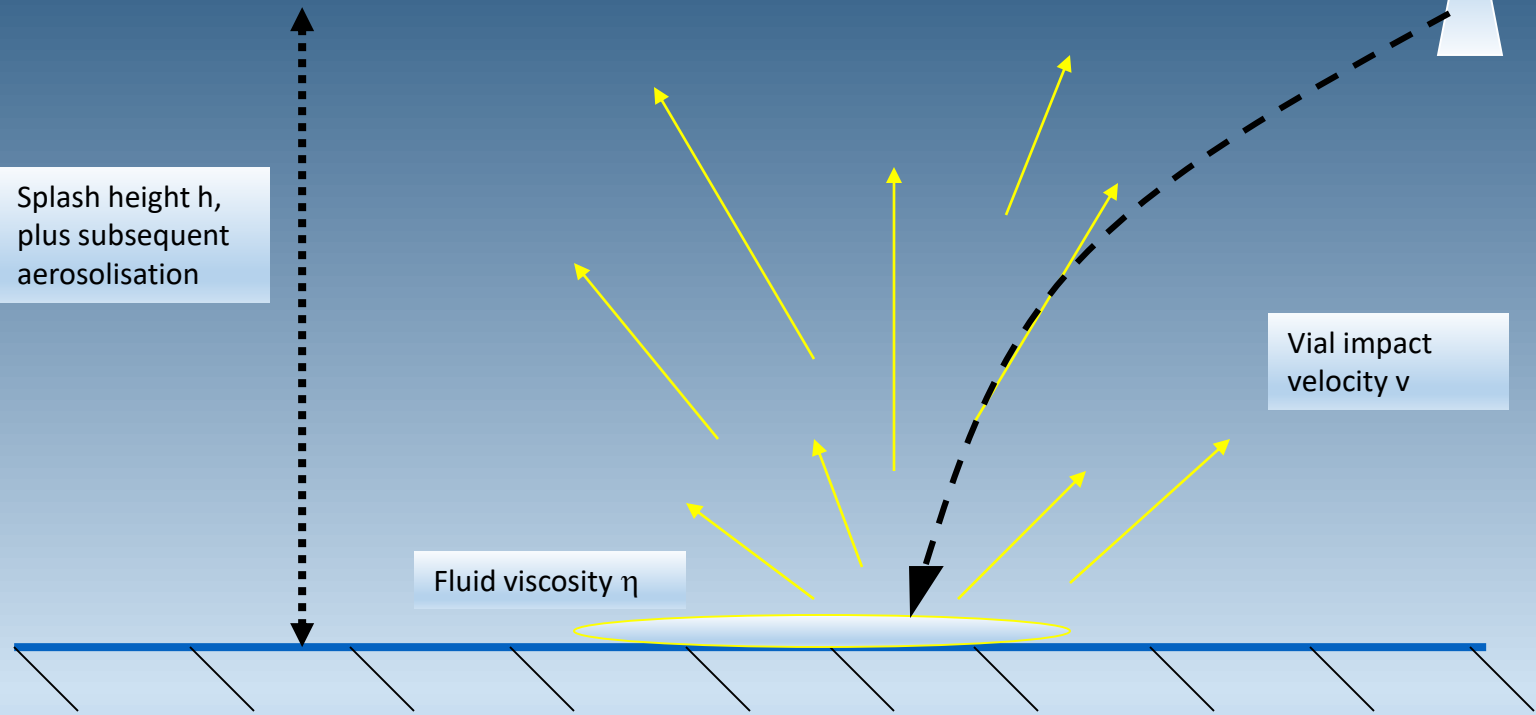
The **2001 anthrax attacks** occurred in the United States over the course of several weeks beginning on September 18, 2001, one week after the September 11 terrorist attacks. Letters containing anthrax spores were mailed to several news media offices and to Democratic Senators Tom Daschle and Patrick Leahy, killing five people and infecting 17 others.

https://en.wikipedia.org/wiki/2001_anthrax_attacks#:~:text=Letters%20containing%20anthrax%20spores%20were%20mailed%20to%20several,complex%20in%20the%20history%20of%20law%20enforcement%22.%20

In New York, military researchers in 1966 spread Bacillus subtilis variant Niger, also believed to be harmless, in the subway system by dropping lightbulbs filled with the bacteria onto tracks in stations in midtown Manhattan. The bacteria were carried for miles throughout the subway system. Army officials concluded in a January 1968 report that: "Similar covert attacks with a pathogenic disease-causing agent during peak traffic periods could be expected to expose large numbers of people to infection and subsequent illness or death."

https://en.wikipedia.org/wiki/Operation_Sea-Spray



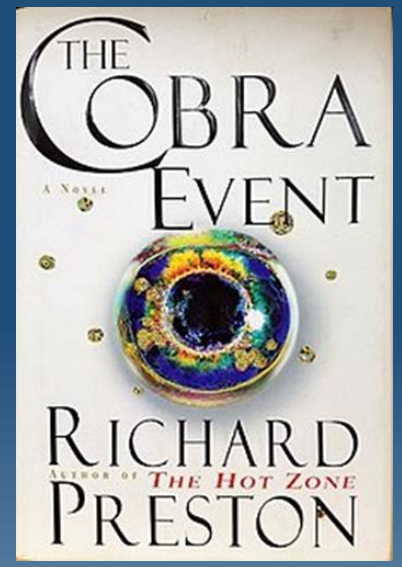


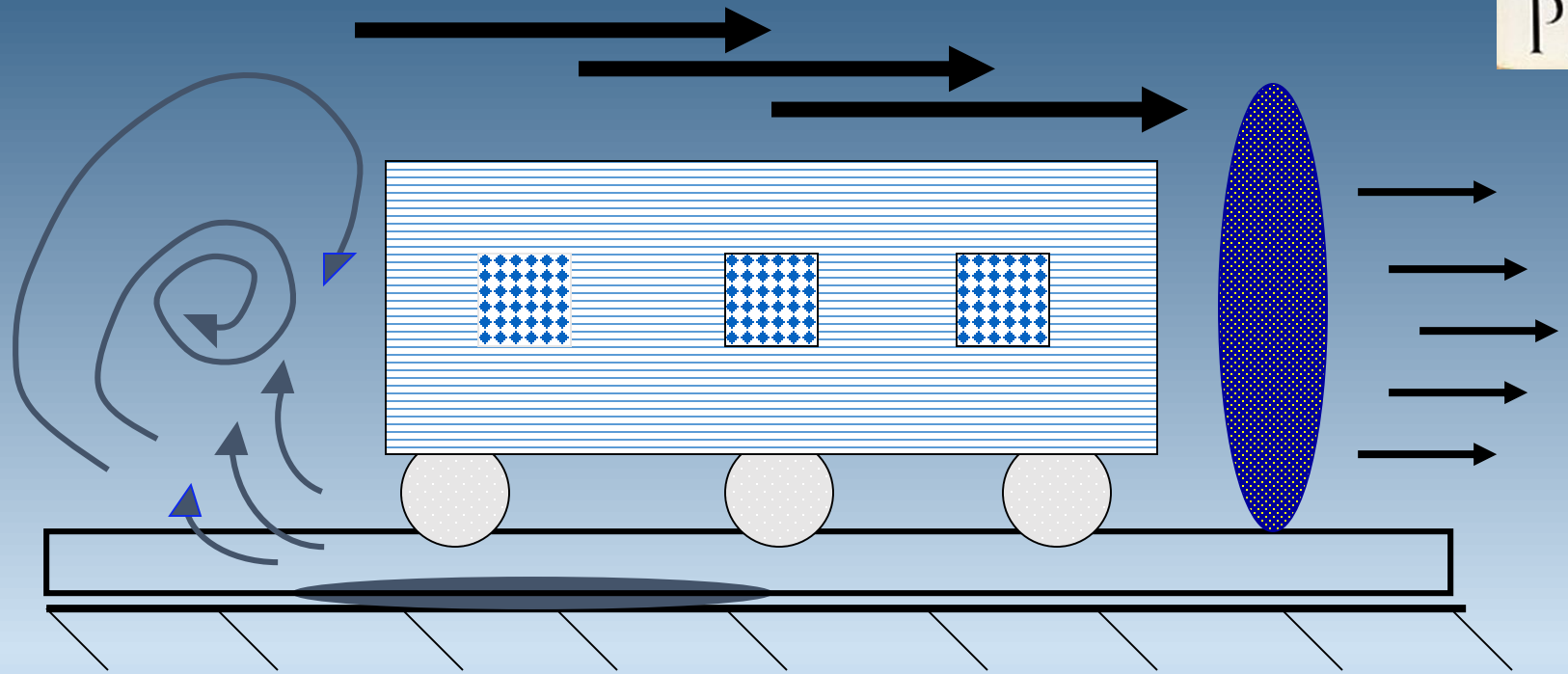
Impact aerosolisation of ground-level infectious fluid

The Army tested 'germ warfare' on the NYC subway by smashing lightbulbs full of bacteria

https://www.businessinsider.com/biological-agents-were-tested-on-the-new-york-city-subway-2015-11?r=US&IR=T

Kevin Loria Nov 15, 2015, 5:00 PM





How could a virus infection create a zombie?!

Zombies exhibit ataxic gaits (fast or slow - *spinocerebellar ataxia*), inability to talk (*expressive aphasia*), inability to recognize faces from their past (*prosopagnosia*), fixation on what is in front of them (*Bálint's syndrome*), insatiable appetites (for human flesh and brains – *hypothalamic damage*)

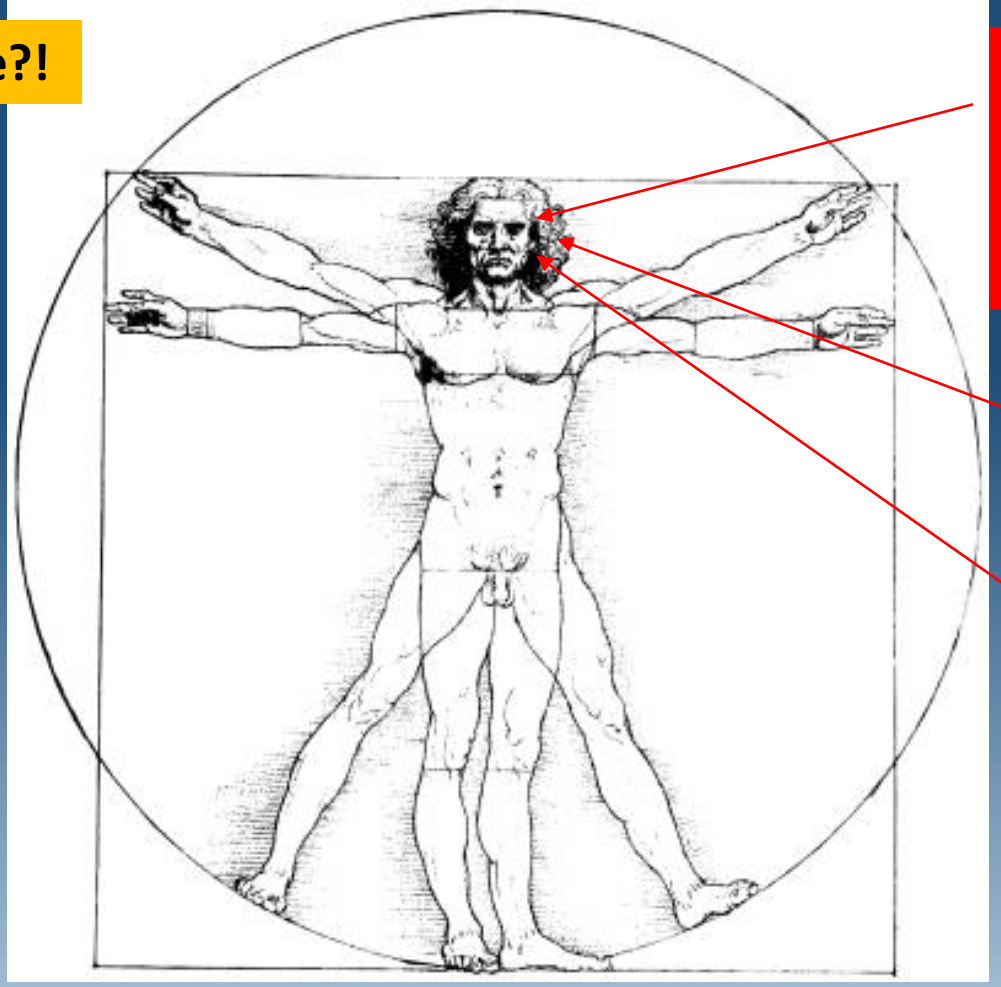
https://www.mentalfloss.com/article/53422/real-life-neuroscience-behind-zombies

Luckily, we don't have any viruses that cause these effects so far – could they be bioengineered? Possible, but very difficult.

Furious rabies may come closest:

weakness or discomfort, fever, or headache
anxiety, confusion, and agitation
delirium, abnormal behavior, hallucinations, hydrophobia (fear of water), and insomnia

https://www.cdc.gov/rabies/symptoms/index.html



HSV-1/2, VZV, JCV, EVD68, EV71, etc. measles, rubella

- human viruses

WNV/SLE/JE/TBE – insect vectors

Rabies/Nipah – mammalian zoonoses/vectors

https://www.mentalfloss.com/article/53422/real-life-neuroscience-behind-zombies

Sexual abuse

SOCIETY | 30/06/2022

Needle spiking arrives in Ibiza

18-year-old claims to have been a victim of this widespread phenomenon in other European countries, where victims are unwittingly injected with drugs

Alba Tarragó

2 min

A discotheque in an archive image. GETTY IMAGES

Llegir en Català | Leer en castellano

PALMA The United Kingdom, Switzerland, France and now Ibiza. The wave of sexual abuse of girls who have been drugged by an injection at a club has arrived in the Balearic Islands, just at the beginning of the

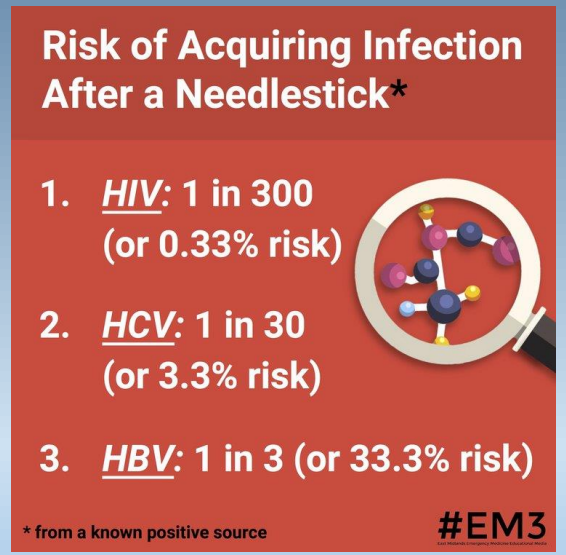
https://en.ara.cat/society/needle-spiking-ibiza-drug-sexual-abuse_1_4420992.html

http://coolpfiles909.weebly.com/blog/online-streaming-needlestick-with-english-subtitles-qhd

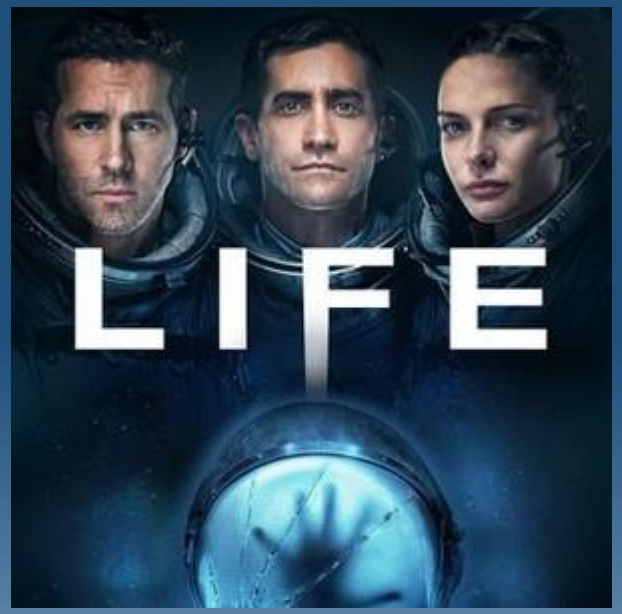
'Needle-spiking' may have other consequences such as the transmission of HIV, HBV, HCV if the needle has been used on others already…

In the future will all night-clubbers need HIV, HBV, HCV protection?!

https://graydon.law/hiv-prep-drugs-now-covered-100-by-health-plans/



https://em3.org.uk/foamed/5/10/2016/i-just-got-a-needlestick



https://www.rottentomatoes.com/m/life_2017

Microbes and space travel – hope and hazards

Julian Wei-Tze Tang*,[1], Andre Henriques[2] & Tze Ping Loh[3]
[1]C/O Clinical Microbiology, 5/F Sandringham Building, Leicester Royal Infirmary, Infirmary Square, Leicester, LE1 5WW, UK
[2]CERN (European Organisation for Nuclear Research), Geneva, Switzerland
[3]Laboratory Medicine, National University Hospital, Singapore
*Author for correspondence: Tel.: +44 116 258 3574/6516; Julian.tang@uhl-tr.nhs.uk

"With plans to return Martian soil and rocks to Earth in the near future for examination, the possible presence of extraterrestrial life-forms in these samples is both a hope and a hazard."

Imaged by Heritage Auctions, HA.com

https://www.the-medium-is-not-enough.com/2008/03/movies_you_should_own_the_andromeda_strain.php

Dealing with the unexpected – new particles, new viruses?

Martian meteorite ALH84001, recovered in Antarctica. Some scientists have suggested that physical and chemical features in this meteorite provide evidence for microscopic fossil life on Mars. That interpretation remains controversial. Photo courtesy of JPL/CALTECH/NASA.

https://www.amnh.org/learn-teach/curriculum-collections/cosmic-horizons-book/fossil-microbes-mars

False positive this time – but what about next time?

Returning Mars Samples to Earth

[Returning Mars Samples to Earth]

NASA and the [European Space Agency (ESA)] are planning ways to bring the first samples of Mars material back to Earth for detailed study.

https://mars.nasa.gov/news/9141/nasas-angie-jackman-works-to-develop-rocket-that-will-bring-mars-samples-to-earth/

Controversy Continues: Mars Meteorite Clings to Life - Or Does It?

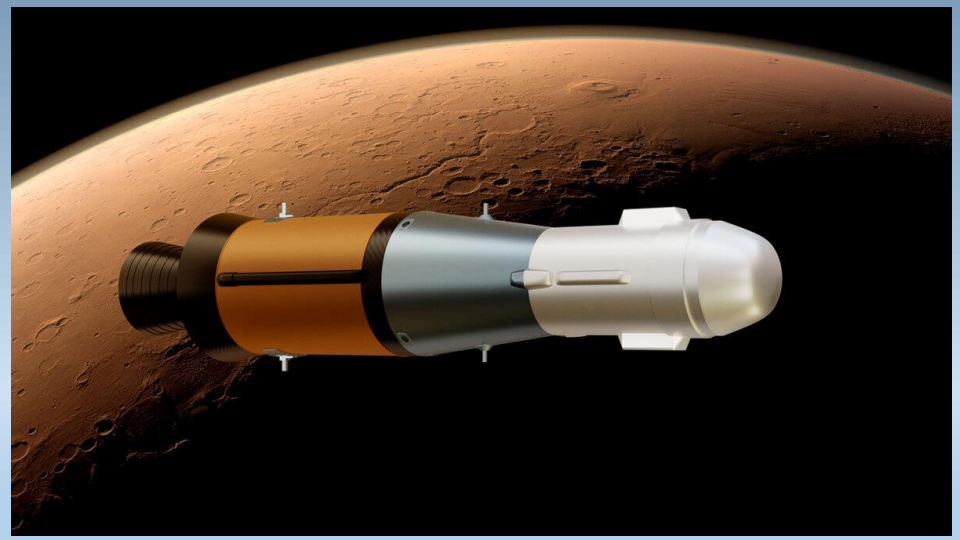
By Leonard David
Senior Space Writer
posted: 09:15 am ET
20 March 2002

HOUSTON, TEXAS Following years of rigorous study, the inside story of whether meteorite ALH 84001 the so-called "Mars rock" harbors evidence for past Martian biology remains steeped in debate.

It was a NASA-led research team that announced in August 1996 that the potato-shaped meteorite found in Antarctica might sport fossilized bacteria. They argued that "lines of evidence" pointed to the likelihood that a primitive form of microscopic life that flourished on the red planet three billion years ago had been found.

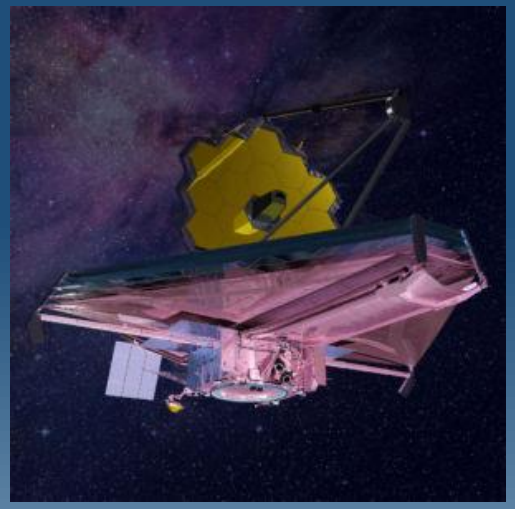
Now, fast-forward from 1996 to five-and-a-half years later.

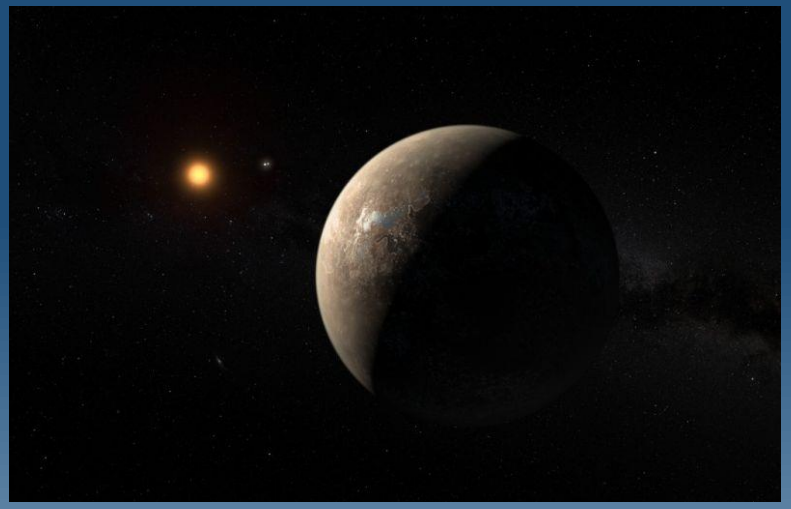
It turns out that rock-solid evidence is hard to come by.



Mars Samples in Orbit (Illustration): This illustration shows NASA's Mars Ascent Vehicle (MAV), which will carry tubes containing Martian rock and soil samples into orbit around Mars, where ESA's Earth Return Orbiter spacecraft will enclose them in a highly secure containment capsule and deliver them to Earth

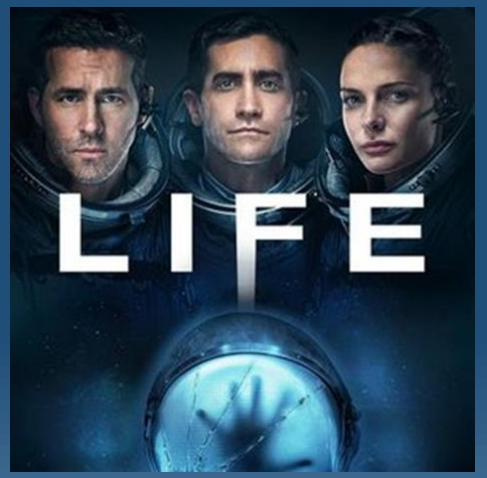
Science fact vs. fiction





https://arstechnica.com/science/2016/09/if-proxima-centauri-b-has-an-atmosphere-james-webb-telescope-could-see-it/

?



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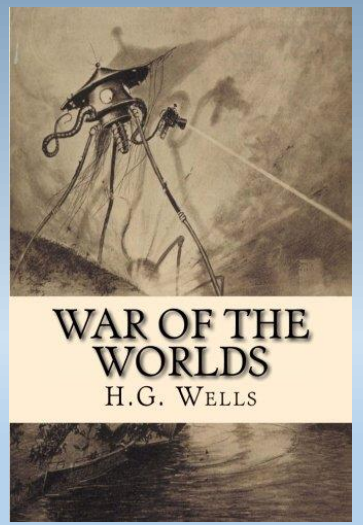
https://www.denofgeek.com/movies/star-trek-the-50-best-alien-races/

?

JWST will look for 'life signatures' on exo-planets – but most likely form of life discovered will be microbes?



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https://prop-replica.weebly.com/blog/star-wars-return-of-the-jedi-ewok

Microbes and space travel – hope and hazards

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[1]C/O Clinical Microbiology, 5/F Sandringham Building, Leicester Royal Infirmary, Infirmary Square, Leicester, LE1 5WW, UK
[2]CERN (European Organisation for Nuclear Research), Geneva, Switzerland
[3]Laboratory Medicine, National University Hospital, Singapore
*Author for correspondence: Tel.: +44 116 258 3574/6516; Julian.tang@uhl-tr.nhs.uk

HSE

Health and Safety Executive

HSE

Advisory Committee on Dangerous Pathogens

The Approved List of biological agents

BACTERIA	
Actinobacillus actinomycetemcomitans	2
Actinomadura madurae	2
Actinomadura pelletieri	2
Actinomyces gerencseriae	2
Actinomyces israelii	2
Actinomyces pyogenes	2
Actinomyces spp	2
Alcaligenes spp	2
Arcanobacterium haemolyticum (*Corynebacterium haemolyticum*)	2
Bacillus anthracis	3

VIRUSES	
ADENOVIRIDAE	2
ARENAVIRIDAE	
LCM-Lassa-virus complex (Old World arenaviruses):	
Ippy	2
Lassa fever	4
Lymphocytic choriomeningitis	3
Mobala	3
Mopeia	3
Other LCM-Lassa complex viruses	2
Tacaribe-virus-complex (New World arenaviruses):	

PARASITES	
Acanthamoeba castellanii	2
Acanthamoeba spp	2
Ancylostoma duodenale	2
Angiostrongylus cantonensis	2
Angiostrongylus costaricensis	2
Anisakis simplex	2
Ascaris lumbricoides	2
Ascaris suum	2
Babesia divergens	2

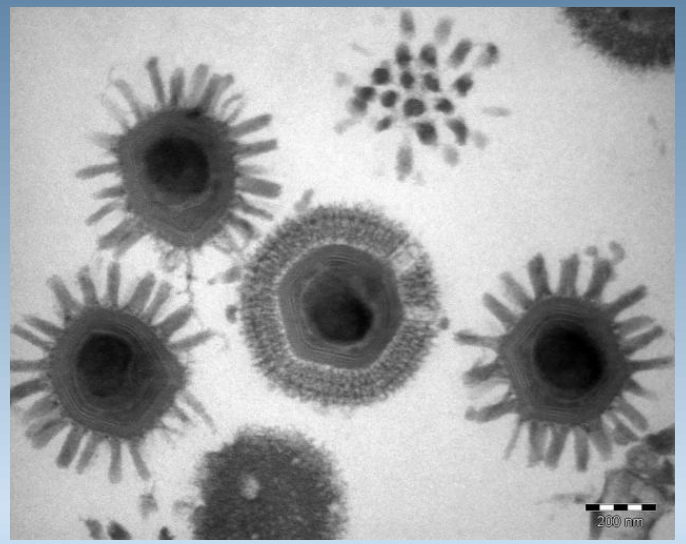
FUNGI	
Aspergillus fumigatus	2
Blastomyces dermatitidis (*Ajellomyces dermatitidis*)	3
Candida albicans	2
Candida tropicalis	2
Candida spp	2
Cladophialophora bantiana (formerly Xylohypha bantiana, Cladosporium bantianum)	3

Extra terrestrial pathogens could be Category 5 on this UK biohazard classification system

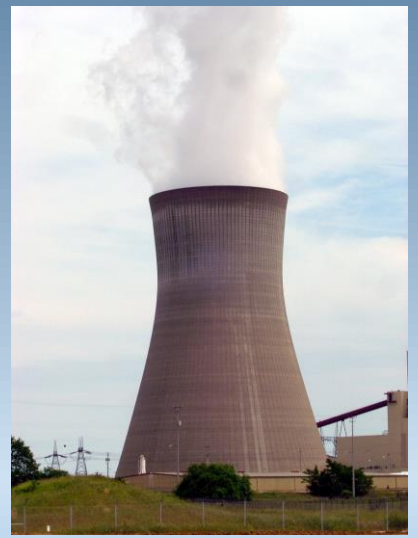
Alien viruses on Earth?

Researchers, in fact, named it Mimivirus — short for "mimicking microbe" — to reflect its large size and apparent Gram-staining properties. The virus has a capsid diameter of 400–500 nanometers (nm) and a total particle diameter, including fibers extending out from the capsid, of approximately 750 nm.

https://www.nature.com/scitable/topicpage/discovery-of-the-giant-mimivirus-14402410/#



https://knpr.org/npr/2017-04/giant-virus-genes-hints-about-their-mysterious-origin



https://www.freeimages.com/photo/cooling-tower-1235460

Acanthamoeba polyphaga mimivirus was isolated from the water of a cooling tower in Bradford, England. Mimivirus readily infects many Acanthamoeba strains, including its preferred laboratory host Acanthamoeba castellanii. Metagenomic surveys indicate that close relatives of the Mimiviridae family are prevalent in the sea, where they probably infect marine heterotrophic protists and regulate plankton populations.

Although mimivirus was isolated in the context of a pneumonia epidemic and initially thought to be an emerging human pathogen based on positive serology, subsequent more specific PCR-based studies failed to detect mimivirus in large numbers of pneumonia patients.

https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/acanthamoeba-polyphaga-mimivirus

PROCEEDINGS B

royalsocietypublishing.org/journal/rspb

Research

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https://doi.org/10.1098/rspb.2022.1073

Received: 2 June 2022
Accepted: 27 September 2022

Viral spillover risk increases with climate change in High Arctic lake sediments

Audrée Lemieux[1,†], Graham A. Colby[1], Alexandre J. Poulain[1] and Stéphane Aris-Brosou[1,2]

[1]Department of Biology, and [2]Department of Mathematics and Statistics, University of Ottawa, Ottawa, Ontario, Canada

AL, 0000-0002-5150-8010; SA-B, 0000-0003-4987-0296

The host spectrum of viruses is quite diverse, as they can sustainedly infect a few species to several phyla. When confronted with a new host, a virus may even infect it and transmit sustainably in this new host, a process called 'viral spillover'. However, the risk of such events is difficult to quantify. As climate change is rapidly transforming environments, it is becoming critical to quantify the potential for spillovers. To address this issue, we resorted to a metagenomics approach and focused on two environments, soil and lake sediments from Lake Hazen, the largest High Arctic freshwater lake in the world. We used DNA and RNA sequencing to reconstruct the lake's virosphere in both its sediments and soils, as well as its range of

Crystal structure of a hachimoji double helix built from four naturally-occurring bases, G (green), A (red), C (blue), T (yellow), and four synthetic bases, B (cyan), S (pink), P (purple), and Z (orange). Notable is the geometric regularity of the pairs, a requirement for evolution.

https://physicsworld.com/a/hachimoji-dna-doubles-the-genetic-code/

HACHIMOJI – 8-base DNA

Four more building blocks

The researchers, led by Steven Benner of Firebird Biomolecular Sciences LLC and the Foundation for Applied Molecular Evolution, both in Alachua, Florida, have now used organic chemistry to design and make four more such building blocks that fit the size and shape of the G:C and A:T pairs and bind with them. These building blocks are P and B, which are analogues of purine, and Z and S, which are analogues of pyrimidine. These duplexes form P:Z and B:S pairs.

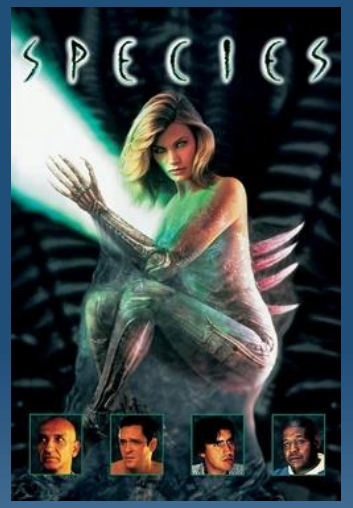
Hachimoji DNA also supports life

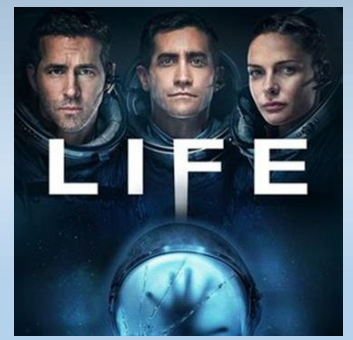
Like natural DNA, hachimoji DNA supports life in that it pairs in a predictable way and copies to make a hachimoji RNA. RNA is important for life since it is via this molecule that DNA transfers information before it is sent to proteins.

Engineering enzymes to transcribe DNA into RNA

To transcribe hachimoji DNA into RNA, the researchers adapted a natural enzyme (T7 polymerase) so that it could accept unnatural genetic molecules. This is one of the main challenges when working with such synthetic DNA systems, says Benner. “Our colleague Andrew Ellington and his team at the University of Texas at Austin re-designed the T7 polymerase, which transcribes natural DNA to natural RNA, by changing amino acids in the protein and finding ones that accept hachimoji DNA to make hachimoji RNA.”

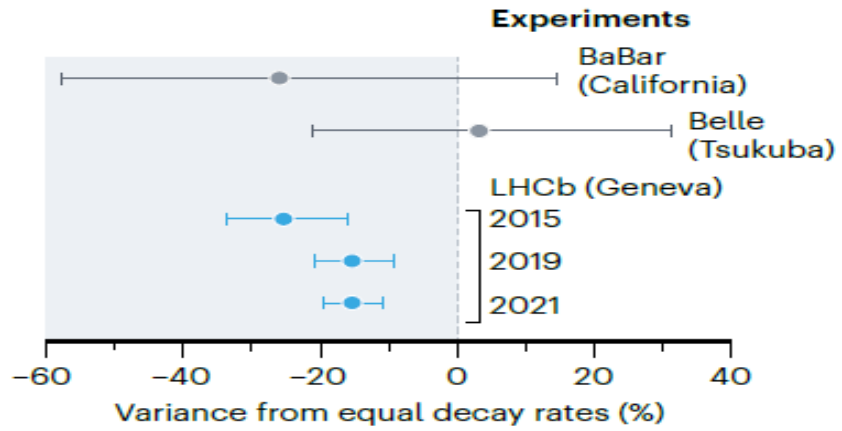
https://www.science.org/doi/10.1126/science.aat0971





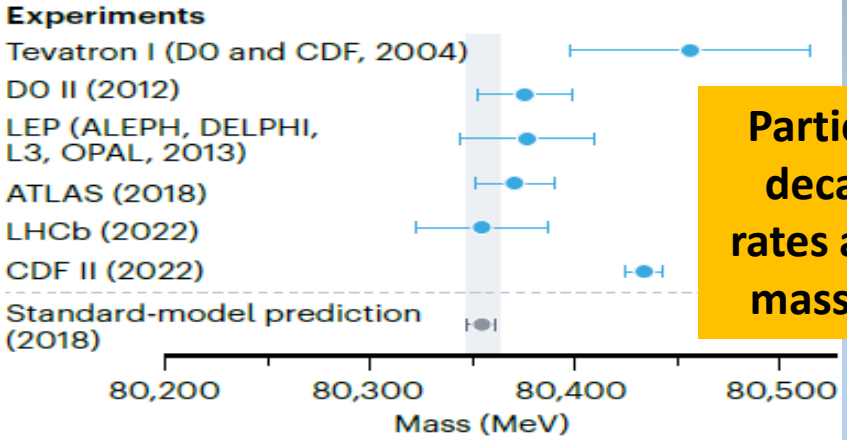
In both physics and virology – we need to find ways to deal with uncertainty – either for science or public health purposes

The LHCb detector has seen the electron decay pathway 15% more often than the muon one. That suggests the influence of particles beyond the standard model. Here's how the LHCb results compare with those from other experiments.



The *W* boson puzzle

The latest analysis of data from the CDF detector at the Tevatron — a US collider — suggests that the mass of the *W* boson is higher than the standard model predicts. Most other experiments disagree.

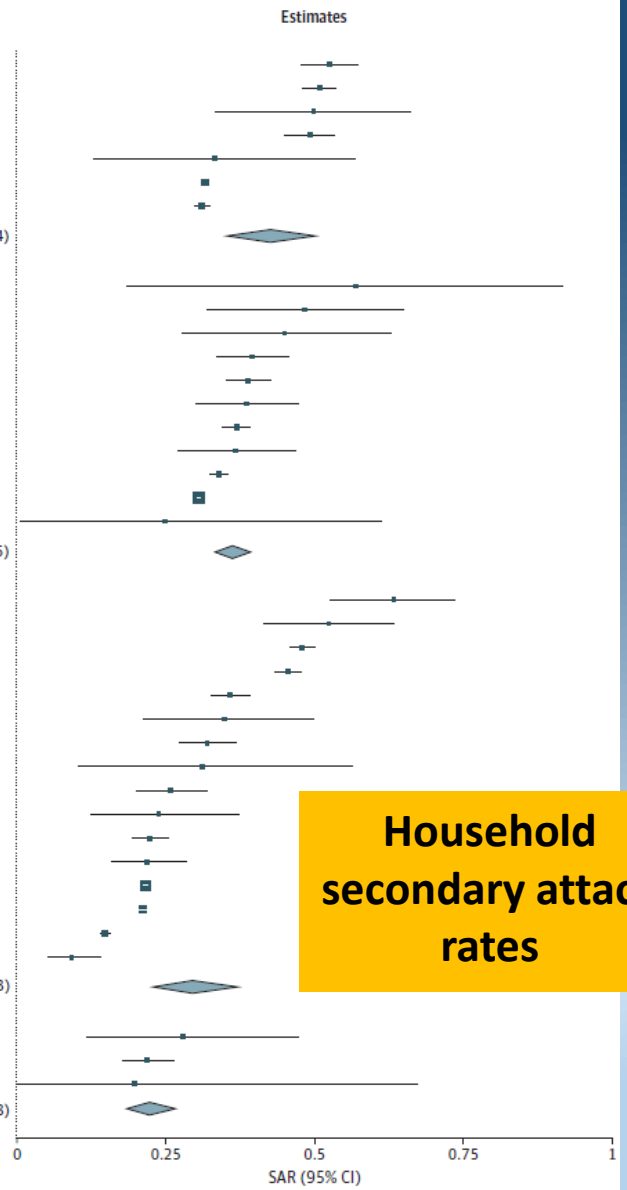


https://www.nature.com/articles/d41586-022-01388-6

Particle decay rates and masses

Figure 2. Household Secondary Attack Rates (SARs) for Omicron (B.1.1.529), Alpha (B.1.1.7), Delta (B.1.617.2), and Beta (B.1.351) Variants

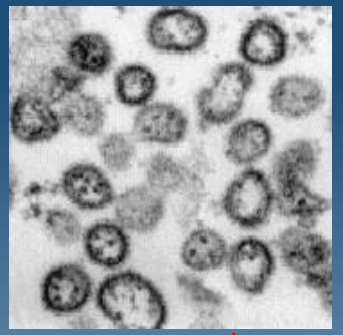
Study; location	Infected	Total	SAR (95% CI)
Omicron (B.1.1.529)			
Baker et al,[63] 2022; US	227	431	0.53 (0.48-0.57)
Jalali et al,[54] 2022; Norway	662	1299	0.51 (0.48-0.54)
Song et al,[68] 2022; South Korea	18	36	0.50 (0.34-0.66)
Del Águila-Mejia et al,[61] 2022; Cantabria, Spain	263	533	0.49 (0.45-0.54)
Smith-Jeffcoat,[67] 2022; New York City, US	6	18	0.33 (0.13-0.57)
Lyngse et al,[62] 2022; Denmark	5702	17945	0.32 (0.31-0.32)
Lyngse et al,[55] 2021; Denmark	1474	4718	0.31 (0.30-0.33)
Subgroup estimate	8352	24980	0.427 (0.354-0.504)
Alpha (B.1.1.7)			
Cohen et al,[18] 2021; South Africa	4	7	0.57 (0.19-0.92)
Watanapokasin et al,[46] 2021; Bangkok, Thailand	17	35	0.49 (0.32-0.65)
Meyer et al,[33] 2021; Germany	14	31	0.45 (0.28-0.63)
Gorgels et al,[23] 2021; Netherlands	99	249	0.40 (0.34-0.46)
Layan et al,[28] 2021; Israel	266	681	0.39 (0.35-0.43)
Tanaka et al,[44] 2021; Osaka Prefecture, Japan	48	124	0.39 (0.30-0.47)
Lyngse et al,[49] 2021; Denmark	637	1719	0.37 (0.35-0.39)
Loenenbach et al,[69] 2021; Germany	34	92	0.37 (0.27-0.47)
Gazit et al,[21] 2021; Israel	1373	4024	0.34 (0.33-0.36)
de Gier et al,[19] 2021; Netherlands	43735	142540	0.31 (0.30-0.31)
Sachdev et al,[50] 2021; San Francisco, US	2	8	0.25 (0.01-0.62)
Subgroup estimate	46229	149510	0.364 (0.334-0.395)
Delta (B.1.617.2)			
Hwang et al,[24] 2021; Daejeon, South Korea	52	82	0.63 (0.53-0.74)
Dougherty et al,[20] 2021; Oklahoma, US	42	80	0.52 (0.41-0.63)
Del Águila-Mejia et al,[61] 2022; Cantabria, Spain	1129	2350	0.48 (0.46-0.50)
Ministry of Health NZ,[35] 2021; New Zealand	902	1976	0.46 (0.43-0.48)
Jalali et al,[64] 2022; Norway	313	870	0.36 (0.33-0.39)
Watanapokasin et al,[46] 2021; Bangkok, Thailand	15	43	0.35 (0.21-0.50)
Cohen et al,[18] 2021; South Africa	115	359	0.32 (0.27-0.37)
Sachdev et al,[50] 2021; San Francisco, US	5	16	0.31 (0.10-0.56)
Singanayagam et al,[42] 2022; UK	53	205	0.26 (0.20-0.32)
Yi et al,[57] 2022; Jeju, South Korea	11	46	0.24 (0.13-0.37)
Ng et al,[37] 2021; Singapore	169	753	0.22 (0.20-0.25)
Kang et al,[26] 2021; Guangdong, China	38	173	0.22 (0.16-0.28)
Lyngse et al,[65] 2022; Denmark	11631	53584	0.22 (0.21-0.22)
Lyngse et al,[55] 2021; Denmark	4923	23156	0.21 (0.21-0.22)
de Gier et al,[70] 2021; Netherlands	1063	7130	0.15 (0.14-0.16)
Ma et al,[66] 2022; Guangzhou, China	15	162	0.09 (0.05-0.14)
Subgroup estimate	20476	90985	0.297 (0.230-0.373)
Beta (B.1.351)			
Cheng et al,[15] 2021; Hong Kong	7	25	0.28 (0.12-0.47)
Cohen et al,[18] 2021; South Africa	81	366	0.22 (0.18-0.27)
Sachdev et al,[50] 2021; San Francisco, US	1	5	0.20 (0.00-0.68)
Subgroup estimate	89	396	0.225 (0.186-0.268)



Household secondary attack rates

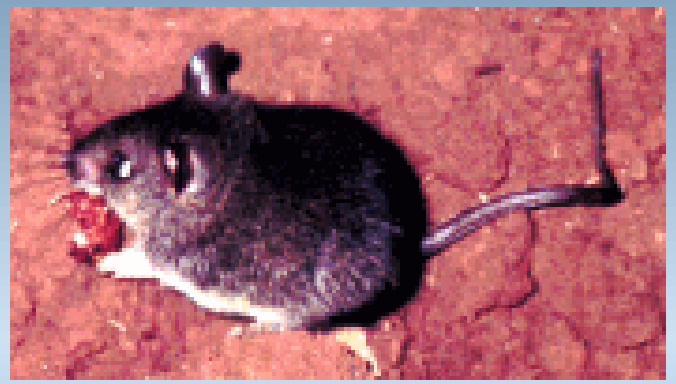
https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2791601

Like particle physics/cosmology - discovering the origins of zoonotic or human virus infections or outbreaks is important – for source control and public health purposes – and to protect both the humans and animals – MPX, SARS, Nipah, Ebola, Zika, Hanta, etc.



Lassa fever virus – an Arenavirus – one of the viral haemorrhagic fever viruses

Rodent vector – sheds virus in urine and faeces that dries then is inhaled by people living in the environment



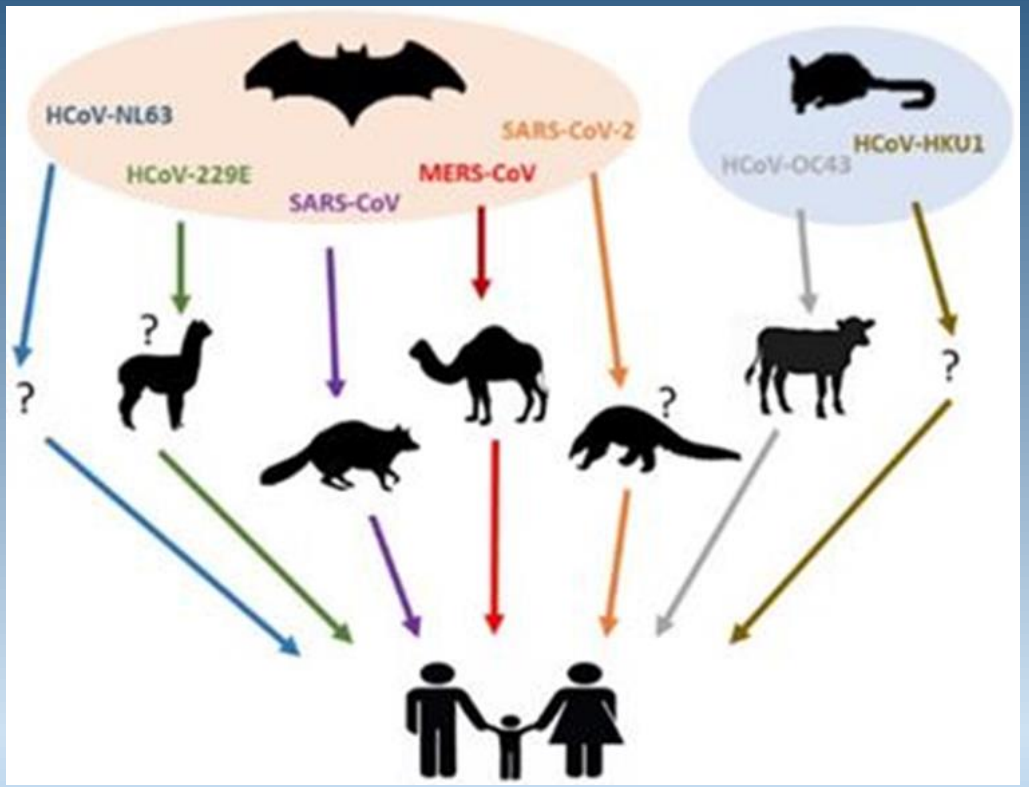
Haemorrhagic conjuctivitis

Lassa fever is endemic to West Africa where the mortality is relatively low – humans are a dead-end host

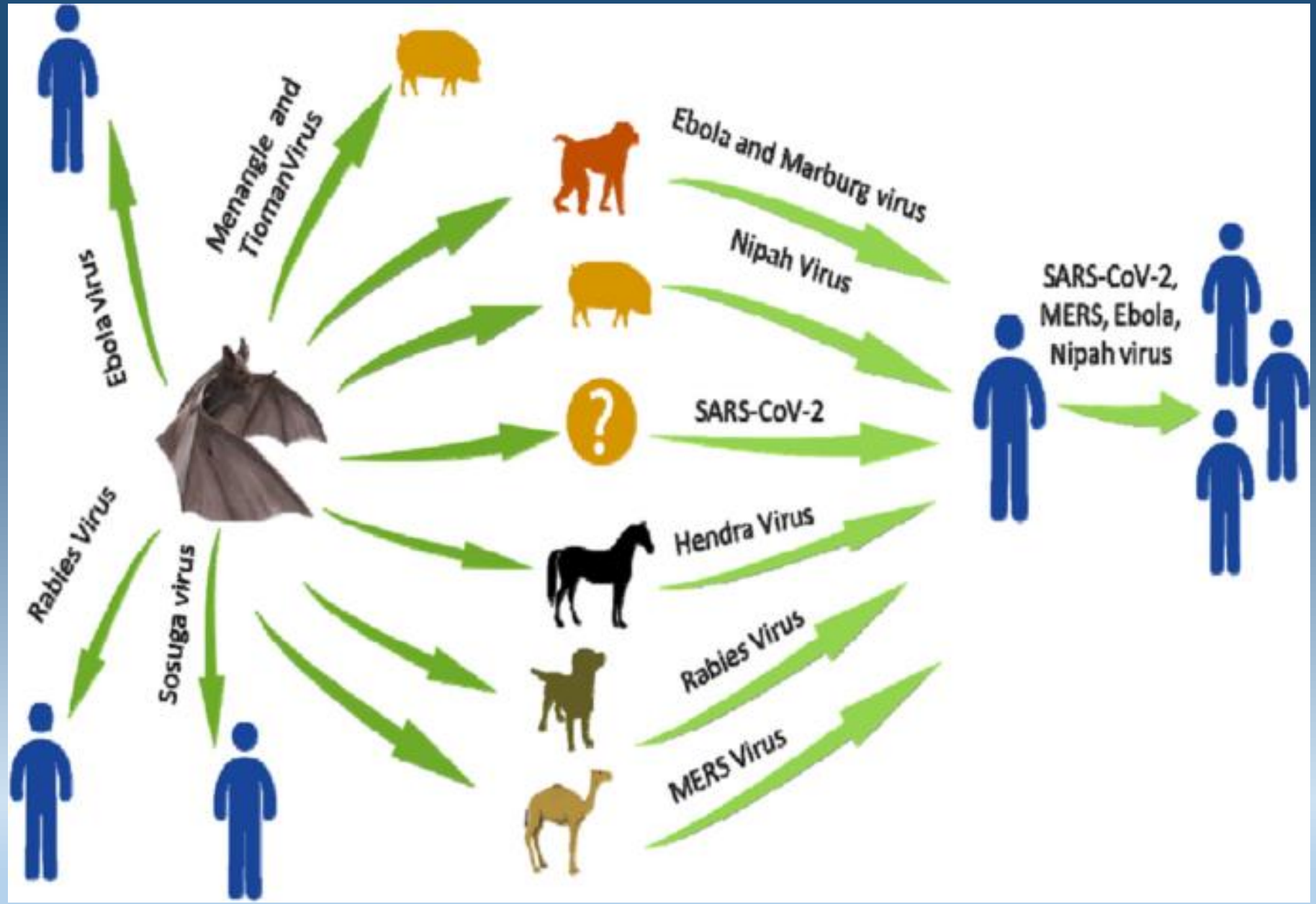
Possible zoonotic reservoirs/sources ?

Unnatural wet markets putting animals together that would normally never meet – poses possible hazards

We are what we eat – along with anything that we pick up along the way…and not only coronaviruses



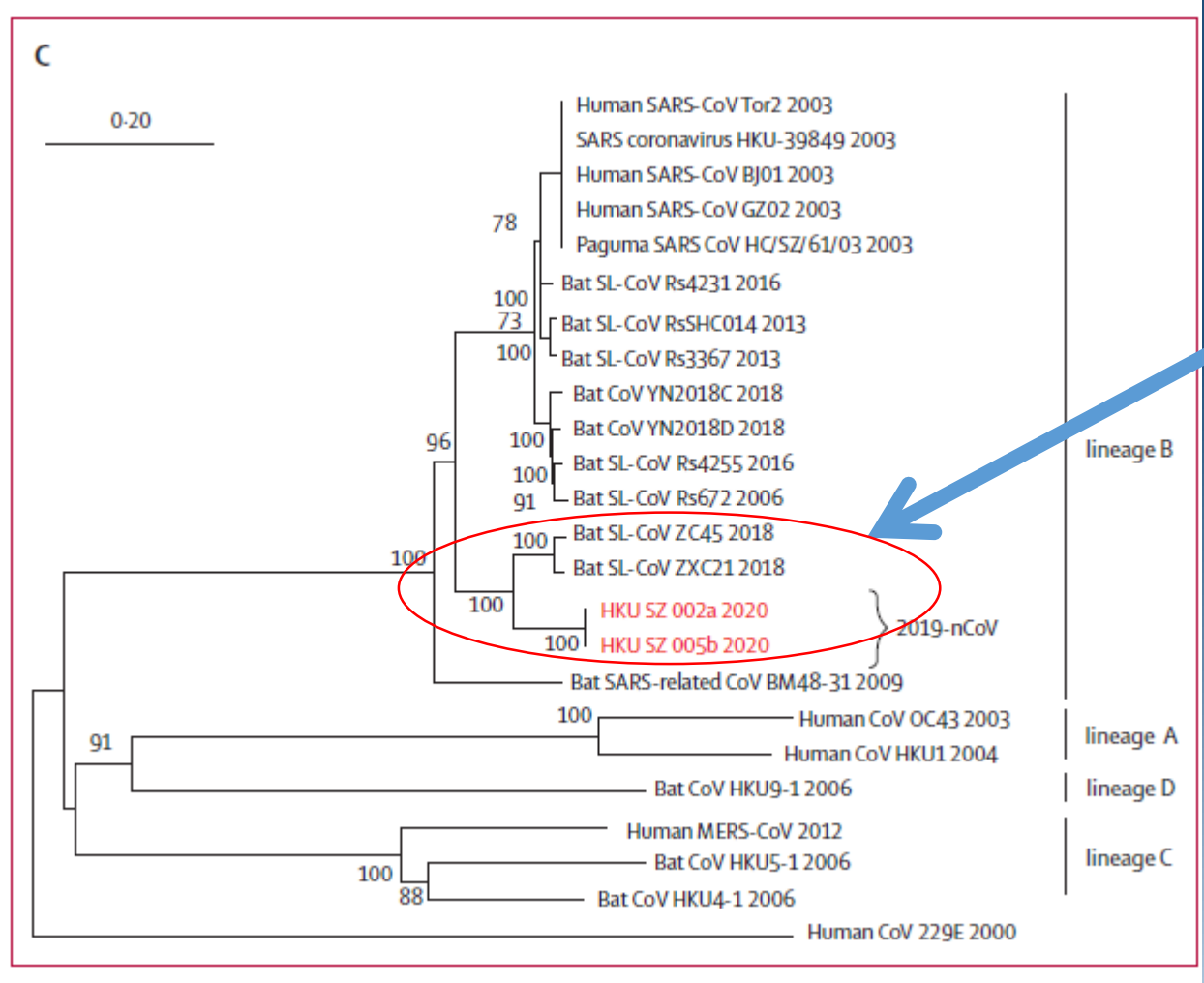
https://informa.airicerca.org/en/2020/04/20/minireview-the-journey-of-sars-cov-2-from-bats-to-humans-across-pangolins/



Bats, mosquitoes, birds are common zoonotic virus vectors – for rabies, dengue, avian influenza, etc. and are usually not sick (i.e. asymptomatic carriers).

Humans disrupting the ecosystem – have already had massive impacts on the welfare of humanity…

https://link.springer.com/article/10.1007/s13337-021-00716-0



Closest phylogenetically to bat SARS-like CoVs – initially – but more recently, the pangolin is *no longer* thought to be the intermediate host

Many false leads and red herrings along the way to determining the true natural reservoir/host

***Figure* 3: Phylogenetic trees of genetic sequences**
(A) Amplicon fragments of RNA-dependent RNA polymerase of patients 1, 2, 4, 5, and 7. (B) Amplicon fragments of Spike gene of patients 1, 2, 4, 5, and 7. (C) The full genome sequences of strains from patients 2 and 5. Red text indicates the coronavirus (CoV) strains detected in the patients in the present study. 2019-nCoV is 2019 novel coronavirus. HKU-SZ-001 refers to the strain detected in the nasopharyngeal swab of patient 1; HKU-SZ-002a refers to strain detected in the nasopharyngeal swab of patient 2; HKU-SZ-002b refers to strain detected in the serum sample of patient 2; HKU-SZ-004 refers to the strain detected in the nasopharyngeal swab of patient 4; HKU-SZ-005 refers to the strain detected in the throat swab of patient 5; HKU-SZ-005b refers to the strain detected in the sputum sample of patient 5; HKU-SZ-007a refers to the strain detected in the nasopharyngeal swab of

https://www.nejm.org/doi/full/10.1056/NEJMoa2001017

Vol 438|1 December 2005 nature

BRIEF COMMUNICATIONS

Fruit bats as reservoirs of Ebola virus

Bat species eaten by people in central Africa show evidence of symptomless Ebola infection.

The first recorded human outbreak of Ebola virus was in 1976, but the wild reservoir of this virus is still unknown[1]. Here we test for Ebola in more than a thousand small vertebrates that were collected during Ebola outbreaks in humans and great apes between 2001 and 2003 in Gabon and the Republic of the Congo. We find evidence of asymptomatic infection by Ebola virus in three species of fruit bat, indicating that these animals may be acting as a reservoir for this deadly virus.

Human Ebola outbreaks that occurred between 2001 and 2005 in Gabon and the

be because PCR-positive bats were recently infected and were tested before they developed a detectable immune response. Alternatively, it could be that differences in the virulence of Ebola virus strains led to different immunological responsiveness and viral replication patterns. Of the bat species collected at Mbomo in February 2003, 7 of 31 (22.6%) and 0 of 10 (0%) were PCR-positive and IgG-positive, respectively, but five months later the corresponding results were 4 of 184 (2.2%) and 12 of 160 (7.5%). These opposite trends in the PCR and serological results are consistent with

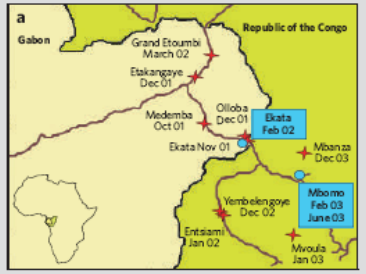
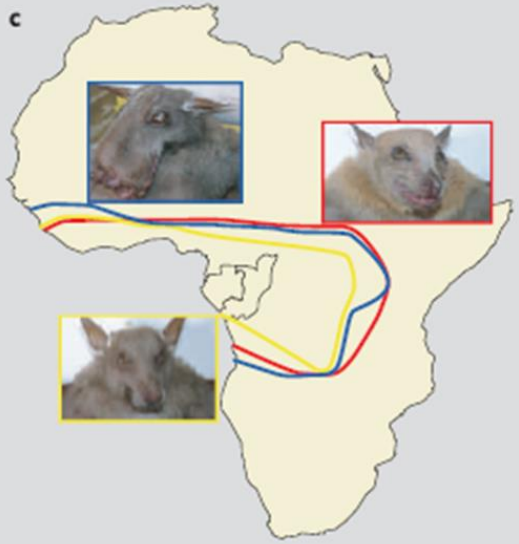
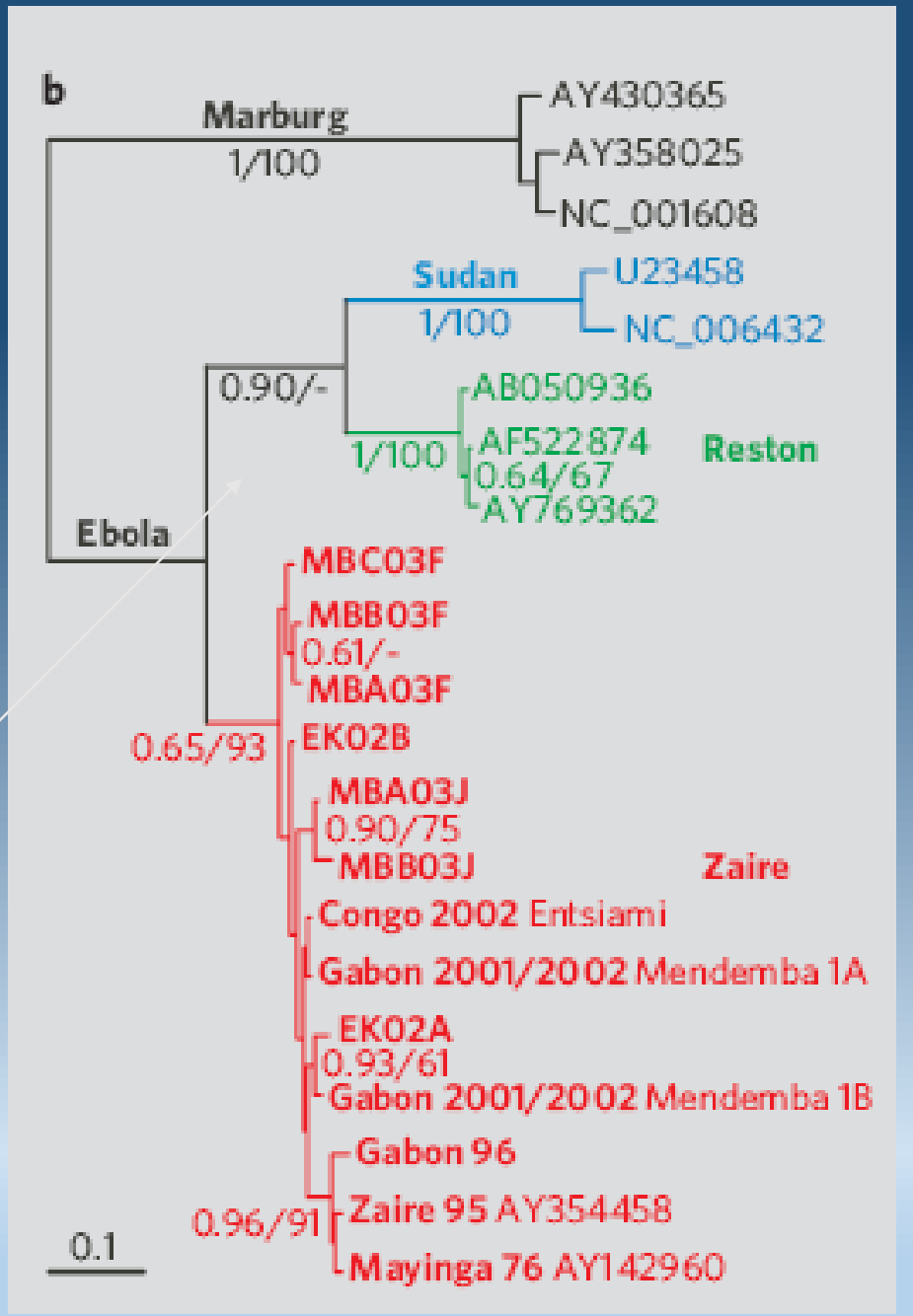


Figure 1 | Fruit bats as potential carriers of Ebola virus. **a**, Dates and locations of animal-trapping sites (blue) and of Ebola virus outbreaks among humans (red stars) in Gabon and the Republic of the Congo. **b**, Phylogeny of Ebola viruses inferred from RNA polymerase sequences. Values below branches are bayesian posterior probabilities (left of slash; values less than 0.5 not shown); bootstrap percentages were obtained by maximum parsimony (right of the slash; values under 50% not shown). (GenBank accession numbers, DQ 205409–205415.) Sequences of the subtype Zaire (red) share five nucleotide signatures in positions 1,755 (T), 1,800 (G), 1,857 (T), 2,002 (A) and 2,003 (C) of the complete coding sequence of the gene encoding RNA polymerase. **c**, Geographic distribution (inside coloured lines) of the fruit bats *Hypsignathus monstrosus* (blue), *Epomops franqueti* (red) and *Myonycteris torquata* (yellow).





Nature 2005;438:575-6

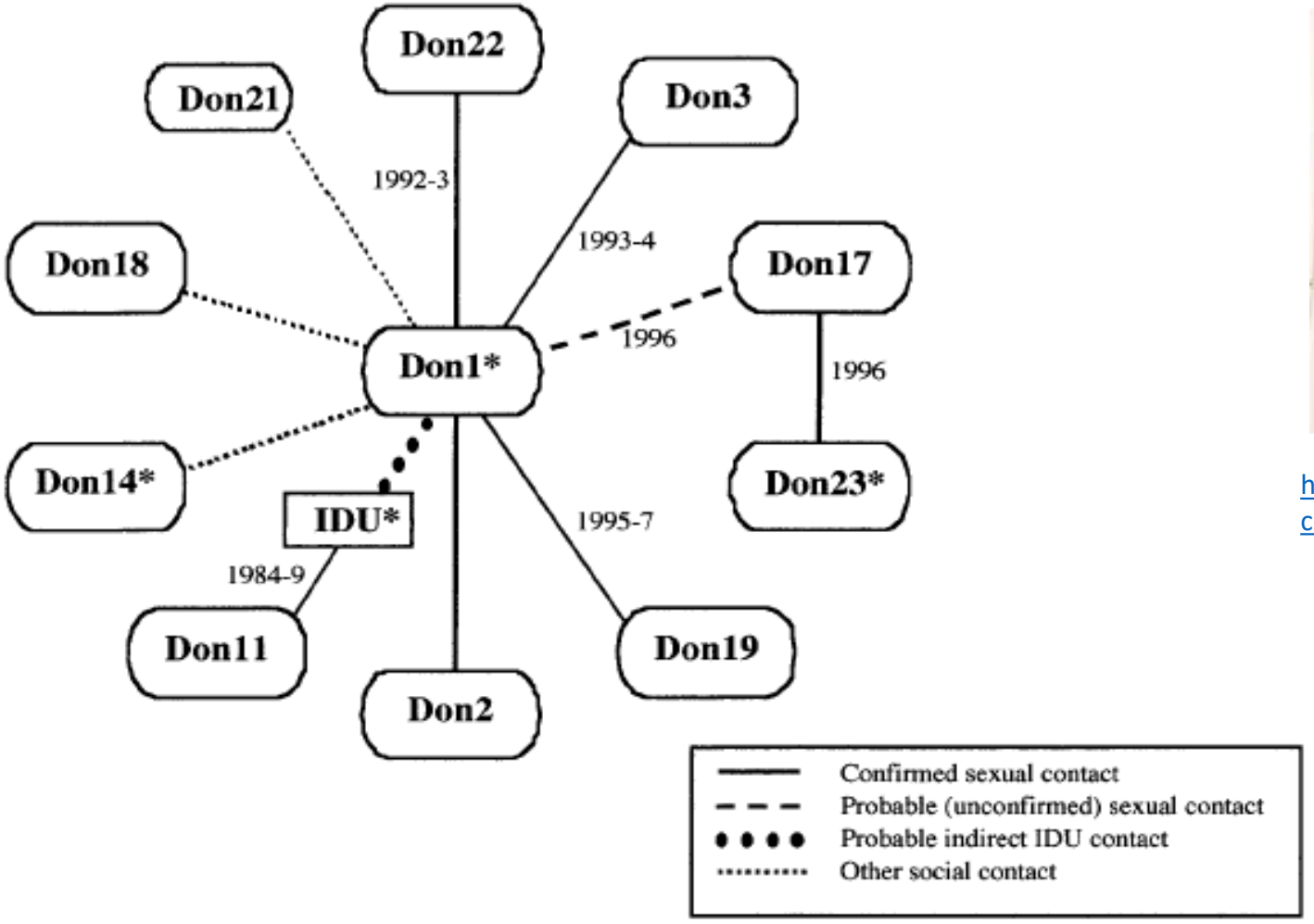
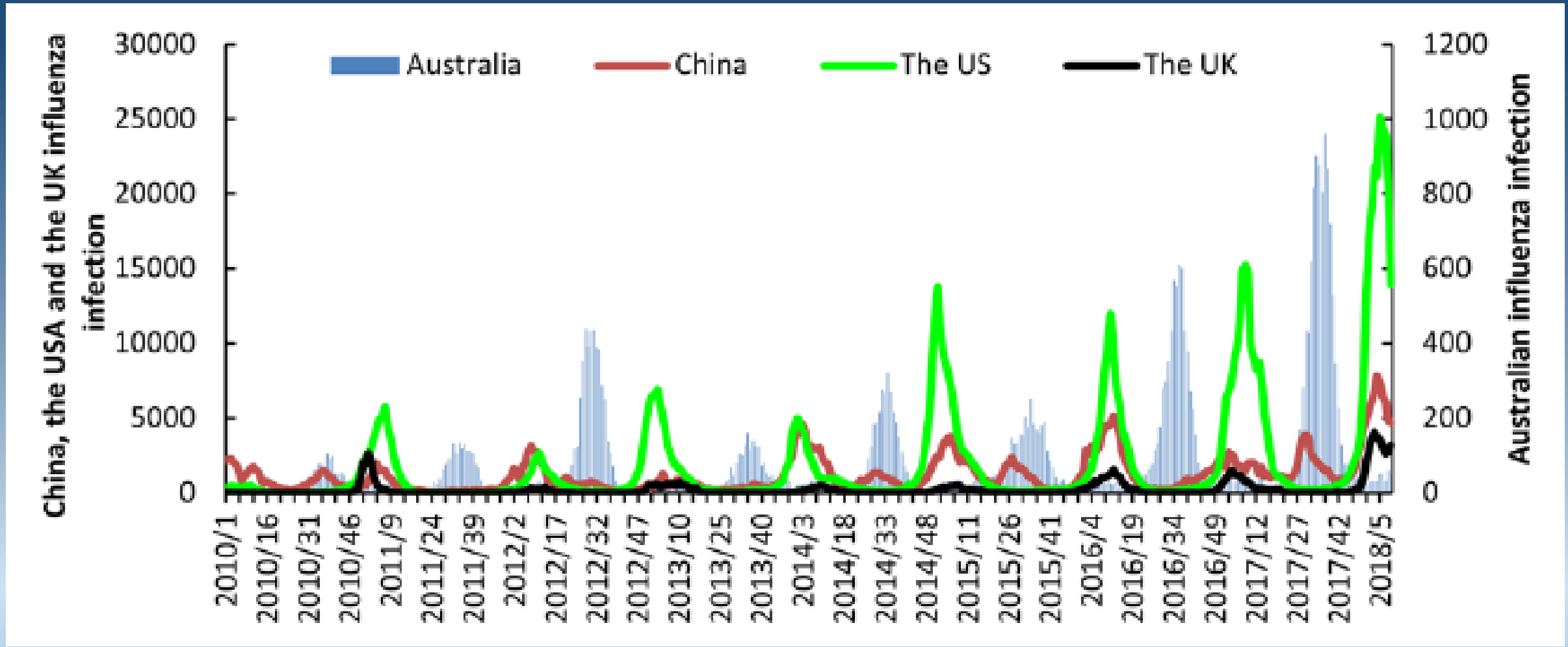


FIG. 1. Network illustrating the known interrelationships between the individuals studied. The social contacts shown indicate that the individuals were all involved in the "nightclub scene" in Doncaster. The probable indirect IDU contact between Don11 and Don1 involved a male drug user with whom Don11 had a relationship (1984–1989), and who may have shared needles with Don1; Don11 had a confirmed social relationship with Don1. "Confirmed sexual contacts" were those confirmed by both partners; the unconfirmed contact was confirmed by only one partner. Male patients are indicated by an asterisk (*).

https://www.telegraph.co.uk/men/thinking-man/11528357/A-club-owners-guide-to-dealing-with-bouncers.html

Hayman A, Moss T, Simmons G, Arnold C, Holmes EC, Naylor-Adamson L, Hawkswell J, Allen K, Radford J, Nguyen-Van-Tam J, Balfe P. Phylogenetic analysis of multiple heterosexual transmission events involving subtype b of HIV type 1. AIDS Res Hum Retroviruses. 2001 May 20;17(8):689-95.

The true real-life mystery of influenza seasonality:



Multi-country: https://www.nature.com/articles/s41598-019-39871-2

Global Influenza Seasonality: Reconciling Patterns across Temperate and Tropical Regions

James Tamerius,[1,2] Martha I. Nelson,[2] Steven Z. Zhou,[3,4] Cécile Viboud,[2] Mark A. Miller,[2] and Wladimir J. Alonso[2]

[1]School of Geography and Development, University of Arizona, Tucson, Arizona, USA; [2]Fogarty International Center, National Institutes of Health, Department of Health and Human Services, Bethesda, Maryland, USA; [3]London School of Hygiene and Tropical Medicine, London, United Kingdom; [4]British Columbia Institute of Technology, Burnaby, British Columbia, Canada

VOLUME 119 | NUMBER 4 | April 2011 • Environmental Health Perspectives

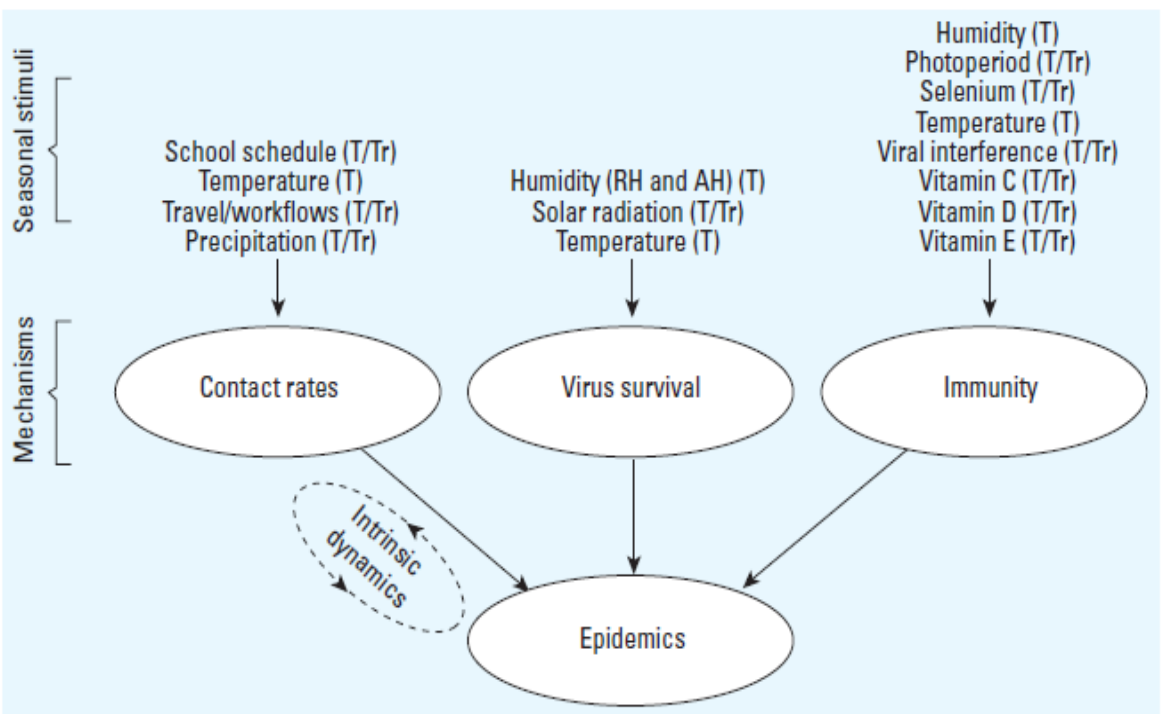


Figure 2. Putative relationship and causal connections among key seasonal stimuli, mediating mechanisms, and influenza epidemics. The notation adjacent to each seasonal stimulus indicates whether it potentially explains influenza seasonality in the tropics (Tr), temperate regions (T), or both (T/Tr). The diagram also includes a component depicting the effects of intrinsic dynamics.

What factors drive this distinct annual seasonal oscillation in human influenza case numbers?

JOURNAL OF VIROLOGY, June 2007, p. 5429–5436 Vol. 81, No. 11
0022-538X/07/$08.00+0 doi:10.1128/JVI.01680-06

MINIREVIEW

Influenza Seasonality: Underlying Causes and Modeling Theories[▽]

Eric Lofgren,[1]*† N. H. Fefferman,[1]† Y. N. Naumov,[2] J. Gorski,[3] and E. N. Naumova[1]

Department of Public Health and Family Medicine, Tufts University School of Medicine, Boston, Massachusetts[1]; Department of Pathology, University of Massachusetts Medical School, Worcester, Massachusetts[2]; and The Blood Research Institute, The Blood Center of Southeastern Wisconsin, Milwaukee, Wisconsin[3]

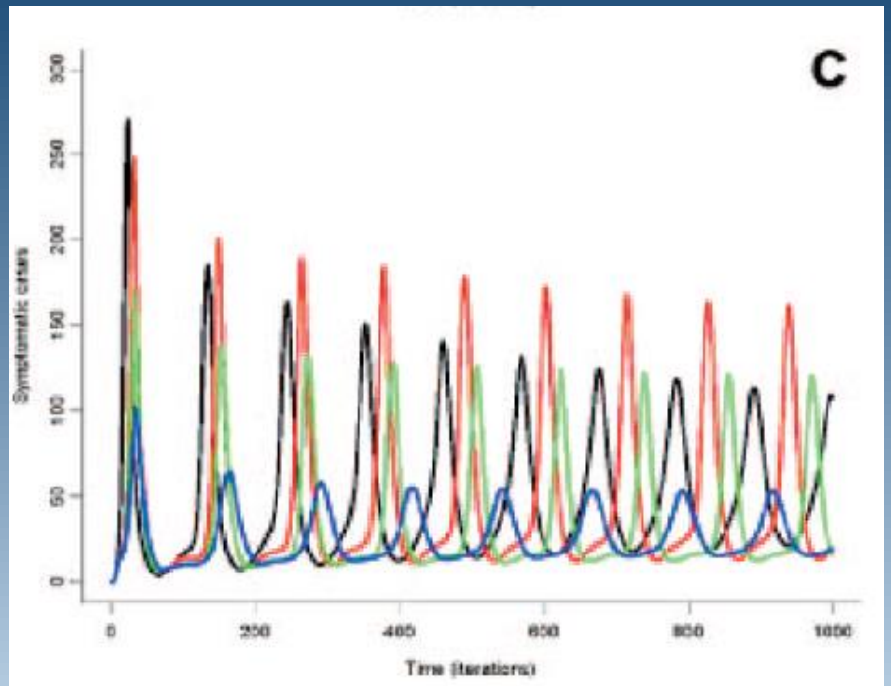
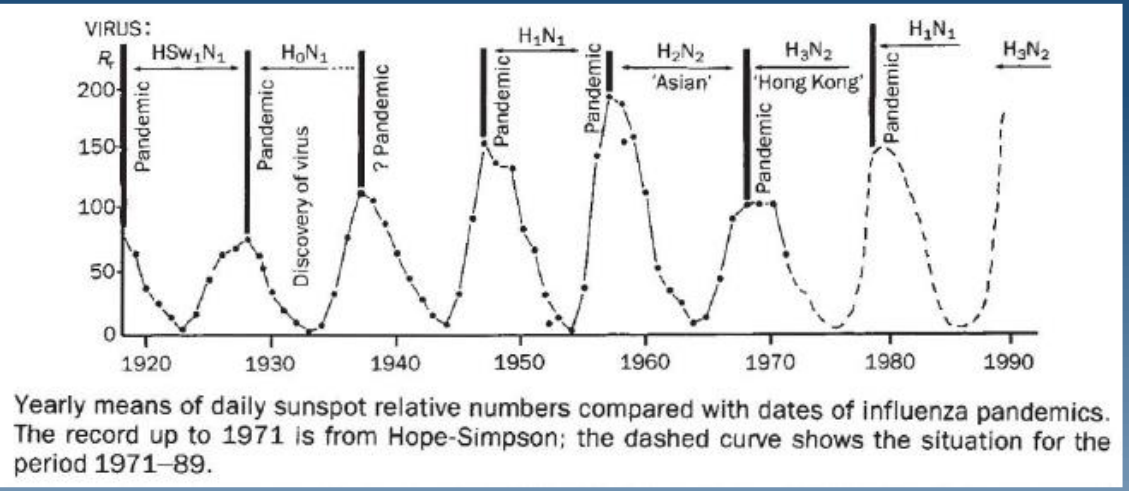


FIG. 1. Different patterns of influenza incidence in a total population, caused by different patterns of social interaction among four etiologically distinct age groups: children <5 years (black lines), children 6 to 20 years (red lines), adults (green lines), and the elderly (blue lines). All 12 modeled scenarios used the same population size and demography. The only differences among the modeled scenarios that yielded constant incidence of influenza (A), rapidly stabilizing, oscillating incidence of influenza (B), or long-term, periodic, oscillating incidence of influenza (C) were in the social interaction rates among these etiological groups. All parameter values and interaction rates held constant throughout each scenario.

Sunspots and influenza



Yearly means of daily sunspot relative numbers compared with dates of influenza pandemics. The record up to 1971 is from Hope-Simpson; the dashed curve shows the situation for the period 1971–89.

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NATURE · VOL 343 · 25 JANUARY 1990

REVIEWS OF INFECTIOUS DISEASES • VOL. 11, NUMBER 3 • MAY-JUNE 1989

HYPOTHESIS

Impact of Atmospheric Dispersion and Transport of Viral Aerosols on the Epidemiology of Influenza

G. W. Hammond, R. L. Raddatz, and D. E. Gelskey

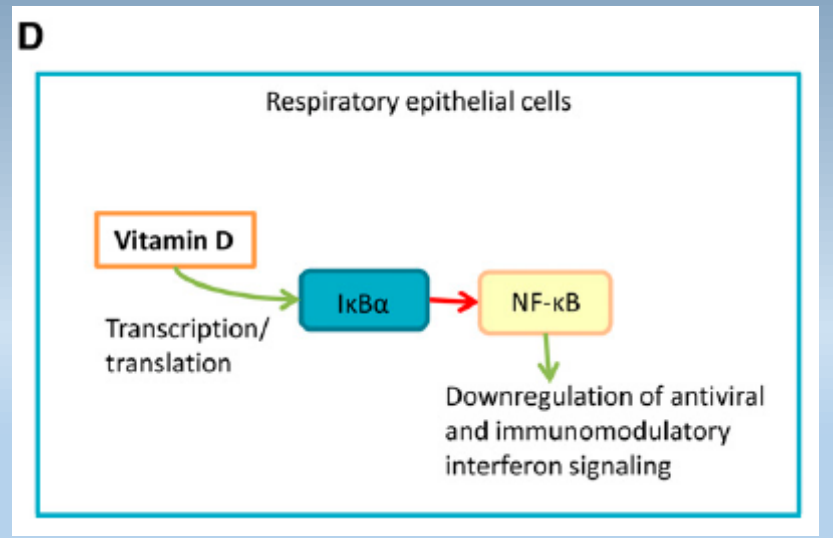
From the Cadham Provincial Laboratory; the University of Manitoba; and the Atmospheric Environment Service, Environment Canada, Winnipeg, Manitoba, Canada

Vitamin D and Influenza[1,2]

Maria E. Sundaram and Laura A. Coleman
Marshfield Clinic Research Foundation, Marshfield, WI

Adv. Nutr. 3: 517–525, 2012; doi:10.3945/an.112.002162.

Vit D promotes antiviral and immunomodulatory signaling via various cascades – so deficiency reduces host immune defences against viral infections



Epidemiol. Infect. (2012), **140**, 78–86. © Cambridge University Press 2011
doi:10.1017/S0950268811000252

Rainfall, household crowding, and acute respiratory infections in the tropics

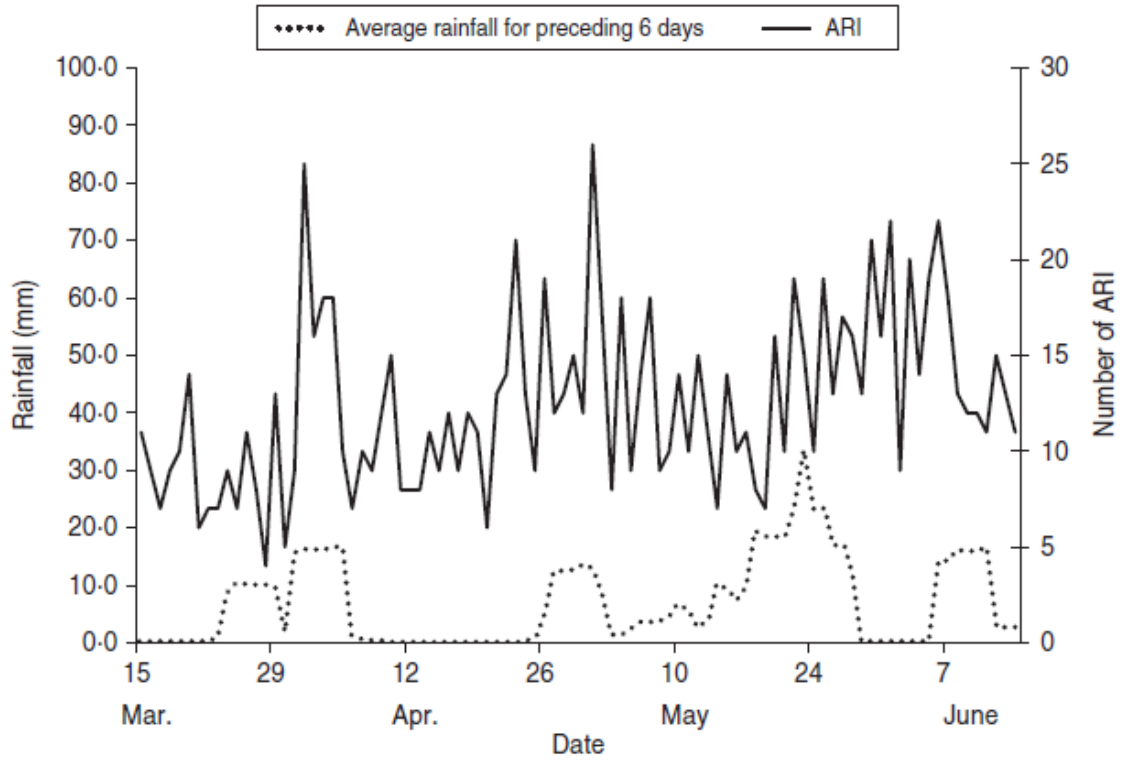


Fig. 4. Daily acute respiratory infection (ARI) by onset date and average rainfall for the preceding 6 days during the analysis period: 15 March to 14 June 2005.

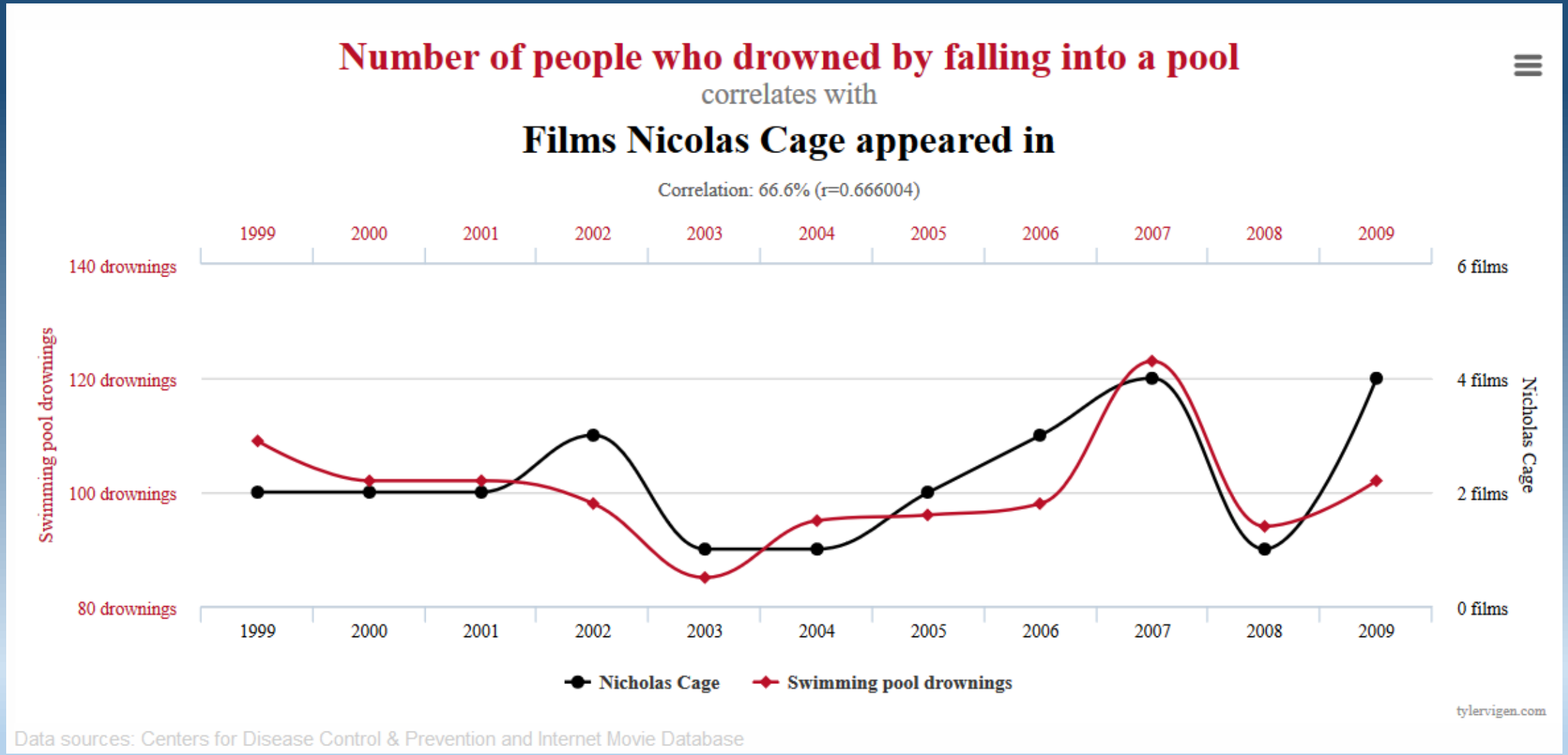
Table 3. *Association between acute respiratory illness (ARI) and rainfall by household crowding*

	OR	95% CI
Overall		
All households	2·97	(1·87–4·70)
Household crowding		
<3 people/room	1·11	(0·25–5·00)
⩾3 people/room	3·31	(2·03–5·38)
⩾3 to <4 people/room	4·20	(1·58–11·18)
⩾4 to <5 people/room	4·22	(1·79–9·94)
⩾5 to <6 people/room	1·55	(0·54–4·47)
⩾6 people/room	3·58	(1·18–10·87)

OR, Odds ratio; CI, confidence interval.
The OR represents the odds of a 25·4 mm (average) increase of rainfall on days −1 to −6 preceding an ARI episode compared to the odds of rainfall on days −1 to −6 preceding control days.

Bad weather drives people indoors and closer together enhancing viral transmission – but only up to a point…

As in physics, we also need to be aware of spurious correlations in viral epidemiology also – though these may also indicate that we are missing something important…



https://occaminvesting.co.uk/problems-with-smart-beta-part-8-backtesting/

Characterization of the Reconstructed 1918 Spanish Influenza Pandemic Virus

Terrence M. Tumpey,[1]* Christopher F. Basler,[2] Patricia V. Aguilar,[2] Hui Zeng,[1] Alicia Solórzano,[2] David E. Swayne,[4] Nancy J. Cox,[1] Jacqueline M. Katz,[1] Jeffery K. Taubenberger,[3] Peter Palese,[2] Adolfo García-Sastre[2]

SCIENCE VOL 310 7 OCTOBER 2005

Site of the mass grave in Brevig Mission, Alaska, where 72 of the small village's 80 adult inhabitants were buried after succumbing to the deadly 1918 pandemic virus.

THE CONVERSATION

Academic rigour, journalistic flair

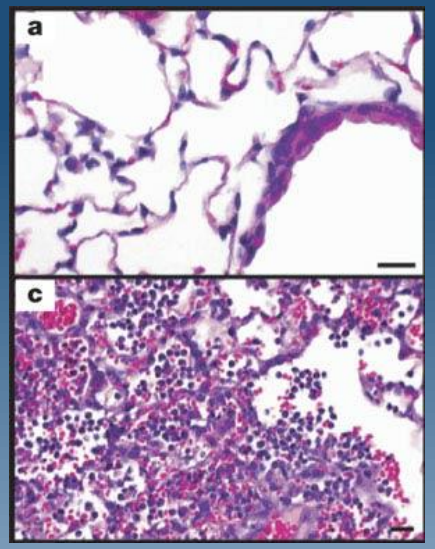
Dinosaurs and people together in Jurassic World. Universal Pictures

Creating dinosaurs: why Jurassic World could never work

The method used by the fictional genetics company, Ingen, involved finding dinosaur DNA still inside fossilised mosquitoes preserved intact in amber, which is sap that seeps from trees and often covers unwary insects…. While it's true we do find superb life-like insect fossils in amber the same age as when dinosaurs lived the insects do not contain even small fragments of their own DNA preserved, let alone the DNA of any dinosaur it may have bitten.

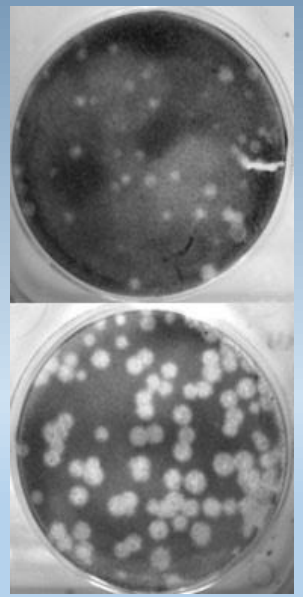
Creation of 1918 A/H1N1 pandemic influenza from buried corpses in Alaska

https://www.cdc.gov/flu/pandemic-resources/reconstruction-1918-virus.html



Top: Mouse lung tissue infected with a human seasonal H1N1 flu virus.

Bottom: The 1918 virus replicates quickly and causes severe disease in the lung tissues of mice, mimicking what was seen in humans in 1918

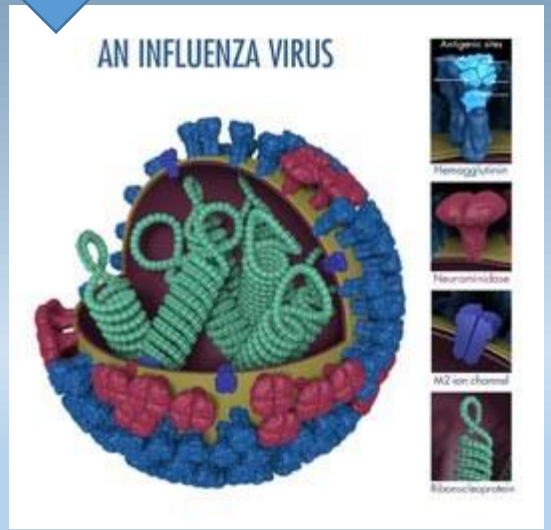


Top: Replication of a human seasonal flu virus called Tx/91 in cell culture.

Bottom: Effect of exchanging the polymerase (PB1) gene of this same virus with that of the 1918 virus, greatly enhancing its replication rate.

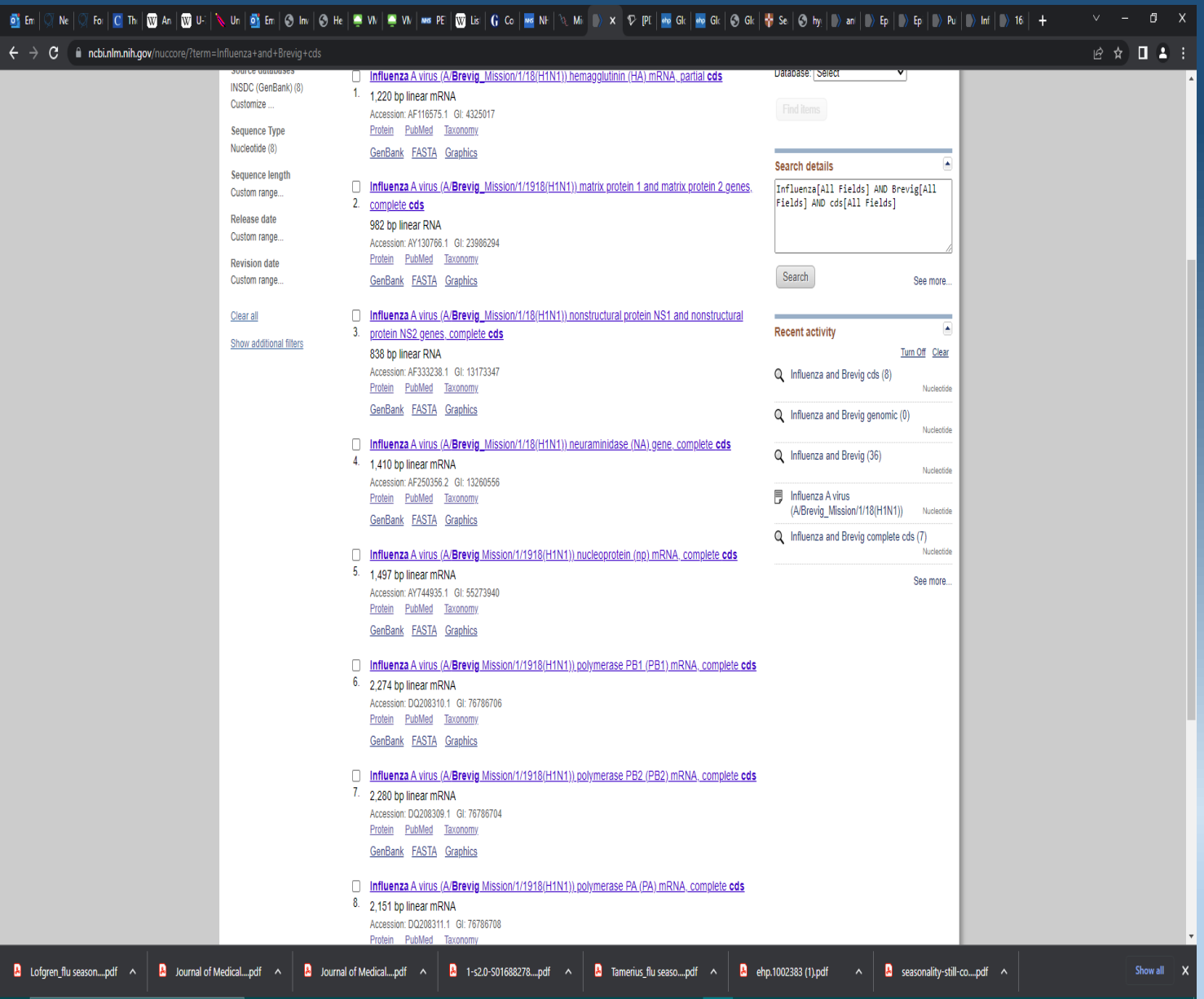
Dr. Terrence Tumpey working in BSL3 enhanced laboratory conditions. This includes (but isn't limited to) use of a powered air purifying respirator (PAPR), double gloves, suit, and working within a Class II biosafety cabinet (BSC).

Johan Hultin excavating a body from the Brevig Mission burial ground.



Influenza virus. Hemagglutinin (HA) is a surface protein of the virus that plays a role in allowing an influenza virus to enter and infect a healthy cell.

7 of the 8 complete gene segments (NA, NP, NS, M, PA, PB1, PB2) of the 1918 Spanish influenza A(H1N1)pandemic virus free to download from NCBI GenBank. 8th gene segment (HA) is also available – but only as a partial sequence: 'Brevig Mission'



But care is needed – a ferret inoculated with this reconstructed 1918 pandemic H1N1 virus bit its handler

The Intercept_

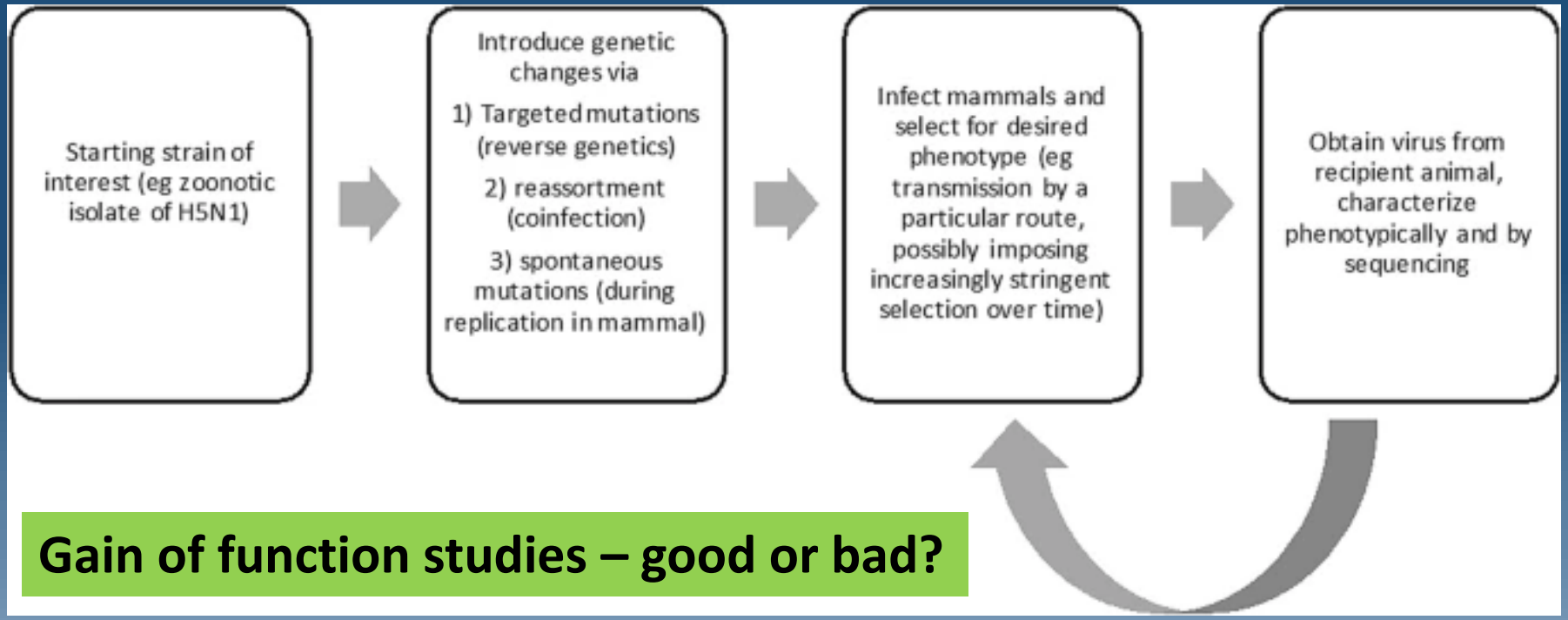
UNFROZEN FLU

Accident With 1918 Pandemic Virus Raises Questions About Pathogen Research

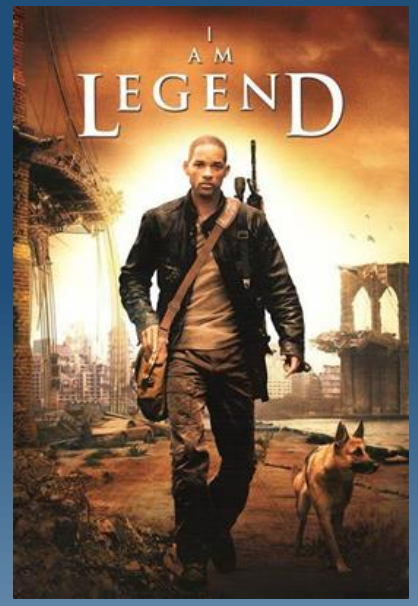
through the world at the end of World War I. To prevent it from sparking another pandemic, 1918 influenza is studied under biosafety level 3 conditions, the second-tightest of biosafety controls available. The researcher at Mount Sinai School of Medicine (now Icahn School of Medicine at Mount Sinai) was wearing protective equipment, including two pairs of gloves. But the ferret bit hard enough to pierce through both pairs, breaking the skin of his left thumb.

The flu is typically transmitted through respiratory droplets, and an animal bite is unlikely to infect a scientist. But with a virus as devastating as 1918 flu, scientists are not supposed to take any chances. The researcher squeezed blood out of the wound, washed it with an ethanol solution, showered, and left the lab. A doctor gave him a flu shot and prescribed him Tamiflu. Then, after checking that he lived alone, a Mount Sinai administrator sent him home to quarantine for a week, unsupervised, in the most densely populated city in the United States. As documents obtained by The Intercept show, staff told him to take his temperature two times a day and to wear an N95 respirator if he got sick and needed to leave for medical care.

https://theintercept.com/2022/11/01/pandemic-1918-flu-virus-biosafety/



Gain of function studies – good or bad?



*Then, at a conference in Malta in September 2011, Prof. Ron Fouchier (Erasmus MC Rotterdam, The Netherlands) presented data from experiments in which **his laboratory had modified a human isolate of H5N1 avian-origin influenza to acquire some mutations expected to adapt it to human-to-human transmission** and then introduced the resulting virus into ferrets.*

*Soon after, the laboratory of Prof. Yoshihiro Kawaoka (University of Wisconsin-Madison, USA) reported a related set of experiments, this time **using a virus created by reverse genetics from a human H1N1 virus and the hemagglutinin gene of a zoonotic H5N1 isolate**.*

https://link.springer.com/protocol/10.1007/978-1-4939-8678-1_29
https://www.science.org/content/article/scientists-brace-media-storm-around-controversial-flu-studies

https://phys.org/news/2022-02-bird-flu-poultry-eastern.html

Lab accidents – where people become infected – allowing the virus to escape into the wider population…

News Coronavirus

Analysis Virus origins

Did covid-19 come from a lab?

Could the coronavirus have sprung from a lab or did it pass to humans from an animal? The evidence is out there, but it could be difficult to locate, says **Graham Lawton**

BEFORE heading off to China as leader of a World Health Organization (WHO) fact-finding mission into the origins of SARS-CoV-2, Peter Ben Embarek recorded an explainer video outlining the state of knowledge at the time, January 2021.

"We know that the first human cases that were detected were detected in Wuhan in December 2019," he said. "We also know that this virus belongs to a group of viruses that have their original niche in bat populations. In between these two points, we don't know much."

Five months on, we actually know less, with the two "knowns" now being called into question. Even though Embarek's investigation concluded that one of the possible origins of SARS-CoV-2 – accidental release from a laboratory – was "extremely unlikely", that possibility still hasn't been ruled out. If anything, the case for a lab leak has grown stronger.

On 23 May, *The Wall Street Journal* claimed that US

Workers at Huanan Seafood Market in Wuhan, China

mission in Wuhan on 9 February, he said that the virus seems to have originated in bats.

human) "both remain viable".

One of the signatories is David Relman at Stanford University

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8177866/pdf/main.pdf

21/09/2022, 15:15 SARS case in laboratory worker in Taiwan, China

World Health Organization

SARS case in laboratory worker in Taiwan, China

17 December 2003 | Departmental news | Geneva | Reading time: 1 min (313 words)

Public health experts in Taipei have reported to the World Health Organization that a 44-year-old male laboratory worker has been infected with SARS. Multiple clinical samples have tested positive for SARS coronavirus in two laboratories in Taiwan, China. Further testing in a WHO SARS international reference and verification laboratory has been recommended as a means of confirming the results.

https://www.who.int/news/item/17-12-2003-sars-case-in-laboratory-worker-in-taiwan-china

https://www.cidrap.umn.edu/news-perspective/2005/04/pandemic-flu-virus-1957-mistakenly-sent-labs

Pandemic flu virus from 1957 mistakenly sent to labs

cidrap.umn.edu/news-perspective/2005/04/pandemic-flu-virus-1957-mistakenly-sent-labs

Apr 13, 2005

Center for Infectious Disease Research and Policy

Apr 13, 2005 (CIDRAP News) – The revelation that samples of the influenza virus that caused the flu pandemic of 1957-58 were inadvertently sent to thousands of laboratories has raised fears of a new pandemic and triggered an urgent effort to destroy the samples.

Samples of the influenza A(H2N2) virus were sent to 3,747 labs, the vast majority of them in the United States, the World Health Organization (WHO) said in a statement last night. The WHO recommended that all the samples, which were sent for use in lab proficiency testing, be destroyed immediately.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4542197/pdf/mBio.01013-15.pdf

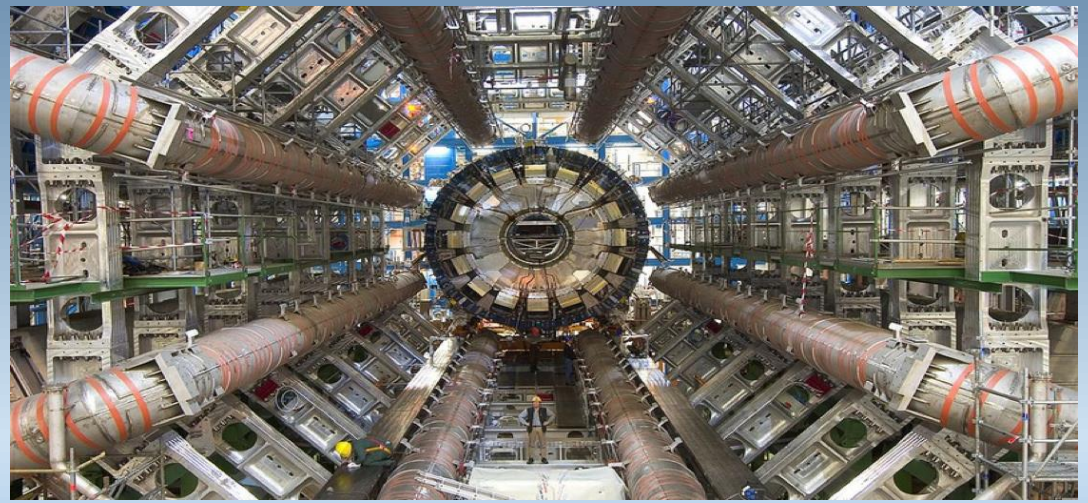
The Reemergent 1977 H1N1 Strain and the Gain-of-Function Debate

Michelle Rozo, Gigi Kwik Gronvall

UPMC Center for Health Security, Baltimore, Maryland, USA

ABSTRACT The 1977-1978 influenza epidemic was probably not a natural event, as the genetic sequence of the virus was nearly identical to the sequences of decades-old strains. While there are several hypotheses that could explain its origin, the possibility that the 1977 epidemic resulted from a laboratory accident has recently gained popularity in discussions about the biosafety risks of gain-of-function (GOF) influenza virus research, as an argument for why this research should not be performed. There is now a moratorium in the United States on funding GOF research while the benefits and risks, including the potential for accident, are analyzed. Given the importance of this historical epidemic to ongoing policy debates, we revisit the evidence that the 1977 epidemic was not natural and examine three potential origins: a laboratory accident, a live-vaccine trial escape, or deliberate release as a biological weapon. Based on available evidence, the 1977 strain was indeed too closely matched to decades-old strains to likely be a natural occurrence. While the origin of the outbreak cannot be conclusively determined without additional evidence, there are very plausible alternatives to the laboratory accident hypothesis, diminishing the relevance of the 1977 experience to the modern GOF debate.

‘Interfering with Nature’ – has been a criticism levelled at both physics and virology



LHC, the Large Hadron Collider is the most powerful particle accelerator. It has been found that LHC also has the potential to give rise to microscopic black holes. Well, it is just a hypothesis given by some scientists that these kinds of black holes would destroy the earth.

A study about microscopic black holes conducted in 2003 concludes:

- The microscopic black holes are so small that they would decay rapidly in just 10-27 seconds. Therefore, they won’t survive for a longer time.
- Even if we can stabilize it, then the rate of absorption would be so slow that the earth would live for billions of years.
- But, the research predicted that the energies at LHC are insufficient to create a microscopic black hole.

So, in every manner, we are safe from the black holes. In reality, this is not going to happen. The black holes are too far to affect us.

https://curiosityunlocked.in/science-and-technology/can-a-black-hole-destroy-the-earth/#:~:text=A%20scientist%20has%20warned%20that%20a%20black%20hole,it%20could%20affect%20the%20one-third%20of%20the%20earth.%E2%80%9D

And…. accidents do happen – in both particle physics and virology!

13 July 1978, 36 years-old Russian scientist Anatoli Bugorski at the Institute for High Energy Physics in Protvino, near Serpukhov, Russia, noticed a problem. To see what's wrong, Bugorski put his head inside the channel, unaware that the accelerator was still running, as the safety warning system was switched off. As soon as his head crossed the invisible proton beam he felt no pain, but he reportedly saw a flash "brighter than a thousand suns."

The beam had entered through the back of his head and exited through his nose, destroying brain tissue and nerves and leaving the left side of his face paralyzed, and deafness in his left ear. He also developed frequent seizures. But his intelligence remained as sharp as ever.

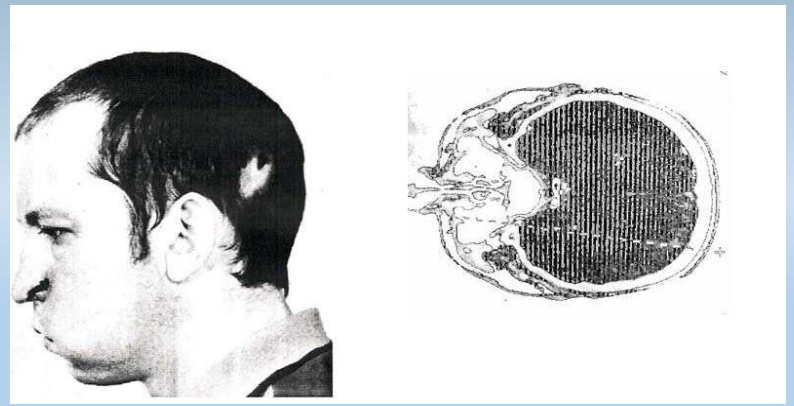
Bugorsky returned to work 18 months later, but promised to appear regularly in the Moscow clinic at least twice a year. Bugorski continued pursuing science, completed his PhD and held the post of coordinator of physics experiments at the U-70 proton synchrotron where the incident occurred.

KAUSHIK PATOWARY FEB 14, 2020
https://www.amusingplanet.com/2020/02/anatoli-bugorski-man-who-stuck-his-head.html

A section of the U-70 proton synchrotron at the Institute for High Energy Physics in Protvino. Photo: Sergey Velichkin/TASS

Anatoli Bugorski. Photo: Andrey Solomonov/Global Look Press

Anatoli Bugorski's swollen face after the accident. The figure on the right shows the path of the proton beam through his skull.



Proton beam therapy

Proton beam therapy is a type of radiotherapy that uses a beam of high energy protons, which are small parts of atoms, rather than high energy x-rays (called "photons") to treat specific types of cancer, such as highly complex brain, head and neck cancers and sarcomas.

Proton beam therapy enables a dose of high energy protons to be precisely targeted at a tumour, reducing the damage to surrounding healthy tissues and vital organs which is an advantage in certain groups of patients or where the cancer is close to a critical part of the body such as the spinal cord.

https://www.england.nhs.uk/commissioning/spec-services/highly-spec-services/pbt/

https://www.comicbooktreasury.com/hulk-reading-order/

Proton therapy has been useful in treating certain cancers. But advanced x-ray treatments for other cancers have seen excellent results with a low risk of major side effects. For these tumors, clinical trials are needed to find out whether proton therapy is better than x-rays. This is important because of the higher cost of proton therapy.

https://www.cancer.net/navigating-cancer-care/how-cancer-treated/radiation-therapy/proton-therapy

A treatment room at the MedAustron centre in Austria, behind which lies a 25m-diameter synchrotron that precisely directs high-energy protons and light ions at tumours. Image credit: MedAustron.
https://cerncourier.com/a/therapeutic-particles/

Thank you CERN!

(and for the many other spin-off benefits)