http://bit.ly/2qgDdAc

Fiction-book narratives: Only six emotional storylines

How scientists are using big data analysis to deconstruct the art of storytelling

Our most beloved works of fiction hide well-trodden narratives. And most fictions is based on far fewer storylines than you might have imagined. To come to this conclusion, big data scientists have worked with colleagues from natural language processing to analyse the narrative in more than a thousand works of fiction. By deconstructing some of the magic of narrative in fiction books, they have also confirmed that there are six different, common ways of telling a story that can be found time and time again in popular stories. They were inspired by the work of US fiction author Kurt Vonnegut, who originally proposed the similarity of emotional story lines in a Masters's thesis rejected by the University of Chicago. These findings have just been published in EPJ Data Science by Andrew Reagan from the University of Vermont, USA, and colleagues.

The authors selected 1,327 books, representative of English works of fiction, from the 50,000 books included in a major open access literature digitisation project called the Gutenberg project. They then applied three different natural language processing filters used for sentiment analysis to extract the emotional content of 10,000-word stories.

The first filter -- dubbed singular value decomposition -- reveals the underlying basis of the emotional storyline, the second -- referred to as hierarchical clustering -- helps differentiate between different groups of emotional storylines, and the third -- which is a type of neural network -- uses a self-learning approach to sort the actual storylines from the background noise. Used together, these three approaches provide robust findings, as documented on the hedonometer.org website.

Reagan and colleagues thus determined that there were only six main emotional storylines. These include 'rags to riches' (sentiment rises), 'riches to rags' (fall), 'man in a hole' (fall-rise), 'icarus' (rise-fall), 'Cinderella' (rise-fall-rise), 'Oedipus' (fall-rise-fall). This approach could, in turn, be used to create compelling stories by gaining a better understanding of what has previously made for great storylines. It could also help teach common sense to artificial intelligence systems.

A. J. Reagan, L. Mitchell, D. Kiley, C. M. Danforth and P. Sheridan Dodds (2016), The emotional arcs of stories are dominated by six basic shapes, EPJ Data Science, 5:31, DOI 10.1140/epjds/s13688-016-0093-1 Kurt Vonnegut presentation of his views on emotional storylines: https://www.youtube.com/watch?v=oP3c1h8v2ZQ

http://bit.ly/2fr0nmh

Women Have Always Lived Longer, Study Finds

Men still aren't living as long as women — and that holds true for humans' primate cousins as well, a new study shows.

By Stephanie Bucklin, Live Science Contributor | November 21, 2016

In the study, researchers looked at data from six populations of humans from both modern and historical times, in different countries. The investigators found that, "in spite of the huge gains in human longevity over the past century, the male-female difference has not shrunk," said Susan Alberts, a professor of biology at Duke University and a co-author of the new study.

The researchers did find that the the amount by which women outlived men varied across populations. For instance, the largest male-female difference in life span among the populations studied was in modern-day Russia, where the gap is approximately 10 years. Much smaller differences were found in other populations such as people living in modern-day Nigeria and India.

Additionally, the scientists found that the gap for nonhuman primates was much smaller than it was for humans.

In the study, the researchers looked at the mortality of six different human populations that represented "the full range of human experience." The scientists drew information about three generally long-lived populations from a large international database called the Human Mortality Database, including the Swedish population from

1751 to 1759, the Swedish population from 2000 to 2009 and the Japanese population in 2012.

The researchers also looked at data from three populations with generally much shorter lives, including two modern hunter-gatherer populations, the Hadza of Tanzania and the Ache of Paraguay, as well as data from a population of freed slaves, who migrated from the U.S. to Liberia between 1820 and 1843.

For nonhuman primates, the researchers looked at data collected from six wild populations of sifakas, muriquis, capuchins, gorillas, chimpanzees and baboons, each with a population somewhere between about 400 and 1,500.

Finally, the researchers also supplemented their data on humans by looking at smaller data sets from an additional 16 human populations, including people in Russia, China, India, the U.S. and other countries.

The study produced three major findings: First, in long-lived populations of humans, such as those of modern-day Japan and Sweden, people's average life spans are fairly consistent, meaning the age of death within populations is fairly similar in different countries: Most deaths in those countries occur when adults are between their late 70s and early 90s. In contrast, other primates' life spans are much shorter and highly variable.

Second, the difference in life span between the people living industrial societies and those living in hunter-gatherer societies was greater than the difference between the hunter-gatherers and the nonhuman primates. People living in industrial societies live 30 to 50 years longer than hunter-gatherers, but hunter-gatherers live only 10 to 30 years longer than nonhuman primates, the researchers found.

Third, the lives of females "tend to be longer and less variable" in length than the lives of males, the researchers found.

In all of the populations, the oldest individuals tended to be females, according to the study. However, for both nonhuman primates and the human populations with shorter life expectancies, the male disadvantage in life span appears to be relatively small.

The reason for this difference between males and females still isn't clear, the researchers said. But the existence of this difference in so many different groups of humans, as well as in nonhuman primates, suggests that the disparity has "deep evolutionary roots," the researchers wrote in their study.

One possible reason for the difference is "that men take more risks," Alberts told Live Science. If men's life spans are cut short by risk-taking behavior, it could explain the gap in longevity between men and women, as well as the greater variability in men's age of death as compared to women's, she said.

Another possibility is that testosterone plays a role, Alberts said. The higher levels of testosterone found in men may compromise their immune systems, which may affect how long they live, she said.

The study had several limitations, such as a relatively small sample size of nonhuman primate populations, the researchers noted.

The research was published today (Nov. 21) in the journal Proceedings of the National Academy of Sciences.

http://bbc.in/2q3cqNC

Five-a-day fruit and vegetable advice 'unrealistic', says new GPs' head

When it comes to fruit and vegetables, two-a-day, rather than five, might be more realistic advice to give families, says one of the UK's leading doctors.

The new chair of the Royal College of GPs, Dr Helen Stokes-Lampard, says lots of people may struggle to afford the recommended amount of daily portions. Public Health England insists five-a-day is affordable and achievable. Dr Stokes-Lampard wants doctors to take a pragmatic approach and offer patients tailored goals.

She also rejects the idea that smokers should always be told to give up. Dr Stokes-Lampard claims many children are being brought up with a culture of not having any fresh fruit and vegetables at all.

And she told BBC Breakfast News: "In the consultation with patients it's vital that GPs sometimes need to tailor the advice to the family in

front of them. That may be starting with one or two portions a day and building up to the five portions a day."

However, she added: "The five-a-day initiative is fantastic and gets my and the profession's 100% support. It is what we should aspire to and in fact, probably, people should be eating more than five portions a day ideally."

On smoking, Dr Stokes-Lampard said: "The guidance that smoking should be completely given up is clear and unequivocal.

"However, if I have a patient in front of me who has smoked 40 a day forever, who really likes smoking and has no desire to give up whatsoever, then what we might be trying to achieve between us is saying 'what about cutting down'. "Patients are individuals. You can't treat everyone the same. If you do, patients can zone out and just completely disregard any advice. And nobody gains from that."

Dr Alison Tedstone, of Public Health England, said: "Five fruit and veg a day is an affordable and achievable target and the cornerstone of a healthy balanced diet."

Five-a-day

Almost all fruit and vegetables count towards your five-a-day
Fruit and vegetables do not have to be fresh, frozen is good too
A portion for an adult is 80g
Beans and pulses only count as one portion, no matter how much you eat
Potatoes, yams and cassava do not count
Sweet potatoes, parsnips, swedes and turnips do count

http://bit.ly/2foCats

Keratin and melanosomes preserved in 130-million-year-old bird fossil

Original keratin and melanosome preserved in a 130-million-year-old Eoconfuciusornis specimen

New research from North Carolina State University, the Chinese Academy of Sciences and Linyi University has found evidence of original keratin and melanosome preservation in a 130-million-year-old Eoconfuciusornis specimen. The work extends the timeframe in which original molecules may preserve, and demonstrates the ability to distinguish between ancient microstructures in fossils.

Eoconfuciusornis, crow-sized primitive birds that lived in what is now China around 130 million years ago, are the earliest birds to have a keratinous beak and no teeth, like modern birds. Previous studies argued that the feathers of these and other ancient birds and dinosaurs preserved small, round structures interpreted to be melanosomes - pigment-containing organelles that, along with other pigments, give feathers their color. However, without additional evidence, it was not possible to prove that these structures weren't just microbes that had coated the feather during decomposition and fossilization.

Eoconfuciusornis is pictured. **Dr. Xiaoli Wang**

Yanhong Pan, associate research fellow at the Chinese Academy of Sciences and corresponding author of a paper describing the research and co-author Mary Schweitzer, NC State professor of biology with a joint appointment at the North Carolina Museum of Natural Sciences, examined feathers from an Eoconfuciusornis specimen taken from the Jehol Biota site in northern China, which is renowned for excellent fossil preservation.

"If these small bodies are melanosomes, they should be embedded in a keratinous matrix, since feathers contain beta-keratin," Schweitzer says. "If we couldn't find the keratin, then those structures could as easily be microbes, or a mix of microbes and melanosomes - in either case, predictions of dinosaur shading would not be accurate."

Pan, Schweitzer and their team used both scanning and transmission electron microscopy to get microscopic details of the feather's surface and its internal structure. They also utilized immunogold labeling - in

which gold particles are attached to antibodies that bind to particular proteins in order to make them visible in electron microscopy - to show that filaments within the feathers were keratin.

Finally, they mapped copper and sulfur to these feathers at high resolution. Sulfur was broadly distributed, reflecting its presence in both keratin and melanin molecules in modern feathers. However copper, which is only found in modern melanosomes, and not part of keratin, was only observed in the fossil melanosomes. These findings both support the identity of the melanosomes and indicate that there was no mixing or leaching during decomposition and fossilization.

"This study is the first to demonstrate evidence for both keratin and melanosomes, using structural, chemical and molecular methods," says Pan. "These methods have the potential to help us understand - on the molecular level - how and why feathers evolved in these lineages."

The work appears in Proceedings of the National Academy of Sciences. The research was supported in part by the National Science Foundation (EAR-1344198), the David and Lucille Packard Foundation, and the National Natural Science Foundation of China. NC State's Wenxia Zheng and Elena Schroeter, and Alison Moyer (now at Drexel University), the Chinese Academy of Sciences' Zhonghe Zhou, Jingmai K. O'Connor and Min Wang, and Linyi University's Xiaoting Zheng and Xiaoli Wang contributed to the work.

Note to editors: An abstract of the paper follows

"Molecular evidence of keratin and melanosomes in feathers of the Early Cretaceous bird Eoconfuciusornis" DOI: 10.1073/pnas.1617168113

Authors: Yanhong Pan, Zhonghe Zhou, Jingmai K. O'Connor and Min Wang, Chinese Academy of Sciences; Mary Schweitzer, Wenxia Zheng and Elena Schroeter, NC State University; Alison Moyer, NC State and Drexel University; Xiaoting Zheng and Xiaoli Wang, Linyi University

http://bit.ly/2fR2MqQ

Study compares immune response of 2 vs. 3 doses of HPV vaccine

Examining whether HPV antibody responses would be noninferior among girls and boys aged 9 to 14 receiving 2 doses compared with adolescent girls and young women aged 16 to 26 receiving 3 doses

In a study published online by JAMA, Ole-Erik Iversen, M.D., Ph.D., of the University of Bergen, Norway, and colleagues examined whether human papillomavirus (HPV) type-specific antibody responses would be noninferior (not worse than) among girls and boys ages 9 to 14 years after receiving 2 doses of the 9-valent HPV vaccine compared with adolescent girls and young women ages 16 to 26 years who received the standard 3 doses.

For this study, conducted at 52 ambulatory care sites in 15 countries, five groups were enrolled:(1) girls ages 9 to 14 years to receive 2 doses 6 months apart (n = 301); (2) boys ages 9 to 14 years to receive 2 doses 6 months apart (n = 301); (3) girls and boys ages 9 to 14 years to receive 2 doses 12 months apart (n = 301); (4) girls ages 9 to 14 years to receive 3 doses over 6 months (n = 301); and (5) a control group of adolescent girls and young women ages 16 to 26 years to receive 3 doses over 6 months (n = 314).

Of the 1,518 participants (753 girls [average age, 11.4 years]; 451 boys [average age, 11.5 years]; and 314 adolescent girls and young women [average age, 21 years]), 1,474 completed the study and data from 1,377 were analyzed. At 4 weeks after the last dose, the researchers found that HPV antibody responses in girls and boys given 2 doses were noninferior to HPV antibody responses in adolescent girls and young women given 3 doses.

"Diseases related to the human papillomavirus impose a substantial health care burden on both the developing and developed world," the authors write. "In many countries, HPV vaccination rates remain suboptimal. Using an effective 2-dose regimen entailing fewer visits could improve adherence to HPV vaccination programs. Co-administration of the 9-valent HPV vaccine with diphtheria, tetanus, pertussis, polio, and meningococcal vaccines could also be completed at the same visit, which has been demonstrated in clinical studies. Based on health economics modeling, use of a 2-dose vaccination schedule could potentially reduce the total costs of HPV vaccination."

"Further research is needed to assess persistence of antibody responses and effects on clinical outcomes."

(doi:10.1001/jama.2016.17615; the study is available pre-embargo at the For the Media website)

Editor's Note: The study was sponsored and funded by Merck & Co, which manufactures the quadrivalent and nonavalent HPV vaccines. Please see the article for additional information, including other authors, author contributions and affiliations, financial disclosures, etc.

Editorial: Two vs Three Doses of Human Papillomavirus Vaccine

"In October 2016, the CDC recommended a 2-dose schedule for adolescents starting the HPV vaccination series before the age of 15 years. This important policy change for the United States is supported by previously published data as well as results from the clinical trial by Iversen and colleagues in this issue of JAMA. This clinical trial, which included 1,518 participants, was the basis for the recent approval from the Food and Drug Administration of a 2-dose series of the 9-valent HPV vaccine for adolescents," writes Lauri E. Markowitz, M.D., of the U.S. Centers for Disease Control and Prevention, Atlanta, and colleagues in an accompanying editorial. "With data from the trial reported in JAMA, evidence now supports a 2-dose schedule in adolescents (aged 9 to 14 years) for all 3 licensed HPV vaccines."

"During the first decade of the HPV vaccination program, knowledge has increased about these highly effective HPV vaccines. Population-level effects of vaccination programs on infection and disease outcomes have exceeded expectations in many countries, and extensive safety evaluations have not identified concerns. In the second decade, reduced dose schedules might help achieve higher HPV vaccination coverage, advance HPV vaccine program introductions in more countries, and further reduce the burden of HPV-associated cancers and disease worldwide."

(doi:10.1001/jama.2016.16393; the study is available pre-embargo at the For the Media website)

Editor's Note: The authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest and none were reported.

http://bit.ly/2q3jIrN

Dementia on the downslide, especially among people with more education

Positive brain health trend may cushion blow on society, but doesn't lessen impact on individual patients and caregivers, U-M researchers say

ANN ARBOR, Mich. -- In a hopeful sign for the health of the nation's brains, the percentage of American seniors with dementia is dropping, a new study finds.

The downward trend has emerged despite something else the study shows: a rising tide of three factors that are thought to raise dementia risk by interfering with brain blood flow, namely diabetes, high blood pressure and obesity.

Those with the most years of education had the lowest chances of developing dementia, according to the findings published in JAMA Internal Medicine by a team from the University of Michigan. This may help explain the larger trend, because today's seniors are more likely to have at least a high school diploma than those in the same age range a decade ago.

With the largest generation in American history now entering the prime years for dementia onset, the new results add to a growing number of recent studies in the United States and other countries that suggest a downward trend in dementia prevalence. These findings may help policy-makers and economic forecasters adjust their predictions for the total impact of Alzheimer's disease and other conditions.

"Our results, based on in-depth interviews with seniors and their caregivers, add to a growing body of evidence that this decline in dementia risk is a real phenomenon, and that the expected future growth in the burden of dementia may not be as extensive as once thought," says lead author Kenneth Langa, M.D., Ph.D., a professor in the U-M Medical School, Institute for Social Research and School of Public Health, and a research investigator at the VA Ann Arbor Healthcare System.

"A change in the overall dementia forecast can have a major economic impact," he adds. "But it does nothing to lessen the impact that each case has on patients and caregivers. This is still going to be a top priority issue for families, and for health policy, now and in the coming decades."

Nearly three-point drop

Langa and colleagues used data and cognitive test results from ISR's long-term Health and Retirement Study to evaluate trends from 2000

to 2012 among a nationally representative sample of more than 21,000 people age 65 or over.

In all, 11.6 percent of those interviewed in 2000 met the criteria for dementia, while in 2012, only 8.8 percent did. Over that time, the average number of years of education a senior had rose by nearly an entire year, from 12 to 13.

"It does seem that the investments this country made in education after the Second World War are paying off now in better brain health among older adults," says David R. Weir, Ph.D., senior author of the paper and director of the Health and Retirement Study. "But the number of older adults is growing so rapidly that the overall burden of dementia is still going up."

Even as these new results come out, the Health and Retirement Study team is in the middle of another large study of dementia in the U.S. that will help refine the techniques for better understanding who has dementia in the American population, and allow them to be used in other countries around the world where HRS "sister studies" are also collecting data.

Langa, who is the Sturgis Professor of Internal Medicine and a member of the U-M Institute for Healthcare Policy and Innovation, notes that the differences in dementia risk according to education level mark an important health disparity now, and likely into the future.

"More Baby Boomers have completed some higher education than any previous generation, but the trend toward more education appears to be leveling off in the U.S. And there are clear disparities in educational attainment according to wealth and ethnicity," he says. "These differences in education and wealth may actually be creating disparities in brain health and, by extension, the likelihood of being able to work and be independent in our older years."

Years of formal education was the only marker tracked among the study participants. But, says Langa, it is likely that the other ways that people challenge and use their brains throughout life--reading, social interactions, what occupation they have, and how long they work -- may also have an impact on dementia risk in later life.

All of these pursuits can help build up a person's "cognitive reserve" of brain pathways that can survive the assault of the physical factors that lead to dementia.

Next steps

Researchers hope to learn much more about the cognitive reserve concept with new funding from recent federal initiatives that aim to increase dementia-related research and discovery.

Continued focus on reducing cardiovascular risk -- through increased physical activity and controlling hypertension and diabetes in younger and middle-aged people -- may also help reduce future dementia rates.

Growing evidence has shown that dementia in older adults is usually due to multiple causes, including Alzheimer's disease, which is characterized by a buildup of abnormal proteins in the brain, as well as vascular dementia, which results from brain tissue not receiving enough blood due to blockages and leaks in the brain's blood vessels.

For those who do develop dementia, Langa notes, the challenge for America going forward will be to address the need for long-term care at home and in institutions, in the face of smaller families with fewer members to act as caregivers.

Even if the slide in dementia incidence continues, the Baby Boom generation's sheer size will mean challenges for those who fund care or provide it.

In addition to Langa and Weir, the study's authors are Eric B. Larson, M.D., M.P.H. of the Group Health Research Institute, Eileen M. Crimmins, Ph.D. of the University of Southern California, and University of Michigan researchers Jessica D. Faul, Ph.D., Deborah A. Levine, M.D., M.P.H., and Mohammed Kabeto, M.S. The study was funded by the National Institute on Aging of the National Institutes of Health (AG00974, AG040278, AG053760, AG024824)

Reference: JAMA Internal Medicine, 2017:177(1):1-9. Doi:10.1001/jamainternmed.2016.6807.

http://bit.ly/2qfDvUs

Cellular starvation kills treatment-resistant breast cancer

Blocking key nutrient may treat aggressive form of breast cancer

DURHAM, N.C. -- Cancer rewires the metabolism of tumor cells, converting them into lean, mean, replicating machines. But like Olympic athletes who rely on special diets to perform, tumor cells' amped-up metabolism can also make them dependent on specific nutrients for survival.

For years, scientists have been trying to identify and understand these cellular cravings in hopes of creating new cancer treatments that work by blocking off access to necessary nutrients and starving tumors to death.

In a new study, Duke University scientists report that cells from a vicious and treatment-resistant form of breast cancer, called triple negative breast cancer (TNBC), die off rapidly when deprived of a key nutrient called cystine. By examining the cause of cell death, they found that this "cystine addiction" is triggered by a mechanism that many kinds of tumor cells use to break away and migrate to new locations in the body.

"This process is well-known and shows up in metastatic cancer cells, and what we found is that it also makes the cells cystine-addicted," said Jen-Tsan Ashley Chi, associate professor of molecular genetics and microbiology at the Duke University School of Medicine and senior author on the study. "This is great news, because these are the cells that we really want to get rid of."

The results indicate that blocking cystine uptake may be an effective way of treating not only triple negative breast cancer, but other aggressive cancers that use this pathway during metastasis. The study appeared online Nov. 21 in Oncogene.

Patients diagnosed with triple negative breast cancer, which constitute about 10 to 20 percent of all breast cancer cases, have few treatment options outside of surgery and chemotherapy. That is because the most successful breast cancer therapies target two of three receptors commonly found in tumor cells -- estrogen receptor, progesterone receptor, or the Her2/neu receptor -- but triple negative breast cancer cells lack all three.

Some studies have hinted that these cells cannot survive without cystine, a molecule built from two copies of the amino acid cysteine linked together.

Earlier this year, Chi's group published a study showing that cells from an aggressive form of kidney cancer are addicted to cystine. To find out if this was also true for triple negative breast cancer, Xiaohu Tang, a previous postdoctoral fellow in Chi lab, submitted both triple-negative and estrogen-positive breast cancer cells to a nutrient deprivation test: growing batches of each cell type in a series of different growth media, each missing just one out of 15 key amino acids.

Most of the cells showed little reaction to these small changes in diet, Chi said. But there was one notable exception.

"The triple negative breast cancer cells were very sensitive to cystine," Chi said. "So if you removed cystine, they just rapidly died, while the other breast cancer cells didn't care."

They subjected the cells to a battery of genetic analyses to pinpoint the cause. They found that the cystine addiction is linked to a process called the epithelial to mesenchymal transition (EMT), a bit of genetic programming that allows stationary epithelial cells, usually stuck in place by tough, zipper-like molecules, to transform themselves into roving mesenchymal cells.

The triple negative breast cancer cells, along with a number of other types of cancer cells, tap into this process to break away from their neighbors and metastasize to spread throughout the body, Chi says. But it appears that this process also triggers a cellular signaling pathway that leads to rapid death as soon as cystine is not available.

"We found that this transition between epithelial and mesenchymal basically opens up a signaling difference that makes the cells very vulnerable to cystine deprivation, leading to death," Chi said. "It is

almost like EMT is opens up a whole highway system (for cystine-mediated death), and therapeutically this could be very useful because there are actually compounds to block this."

Chi says the team is now in the process of testing out these cystine-blocking molecules on tumors and searching for biomarkers that will help identify when cancers are likely to respond positively to this treatment. "Tumor cells use this EMT programming to move faster, to move around the body," Chi said. "We want to take advantage of this same pathway to cure you."

This research was supported by funding from the National Institutes of Health (CA125618 and CA106520) and the Department of Defense (W81XWH-12-1-0148, W81XWH-14-1-0309 and W81XWH-15-1-0486).

CITATION: "Cystine addiction of triple negative breast cancer associated with EMT augmented death signaling," Xiaohu Tang, Chien-Kuang Ding, Jianli Wu, et al. Oncogene, online Nov. 21, 2016. DOI: # 10.1038/onc.2016.394

http://bit.ly/2fRcuJS

The cost of feeling like a fraud

New study on the impostor phenomenon in the workplace shows how it affects career prospects and productivity

Have you ever felt that you are not good enough and that someday soon someone will see through your façade of competence and expose you a fraud in your job? If so, you are not alone.

This sensation of being a fake in the workplace, somehow in a position beyond one's true capabilities is known as "the impostor phenomenon". Some estimate that about 70% of people from all walks of life feel like impostors for at least some part of their careers. The sensation is far from pleasant, but a new study from the University of Salzburg, Austria that was published in Frontiers in Psychology, suggests that it might not only be detrimental to your self-esteem but to your career prospects and business as well.

Dr. Mirjam Neureiter and Dr. Eva Traut-Mattausch studied the responses to an anonymous online survey of 238 university alumni, now working across a variety of sectors and professions. They were interested in how the impostor phenomenon would affect a sufferer's attitude to their career development, the ability to adapt to new working conditions and their knowledge of the job market.

They found that this suite of career self-management factors was negatively affected by the phenomenon, demonstrating that those who feel like fakes, though high-achieving, tend not to fulfil their full potential. By undervaluing their talent, workers could be ruining their careers and companies.

But they did find one positive effect of the phenomenon. "It seems to encourage people to offer their best performance ... to prevent being uncovered as frauds," explains Dr. Neureiter.

Previous studies have demonstrated that people who are confident in their abilities feel - and are - more able to learn from and adapt to changes in the work place, to a much greater degree than those who doubt themselves. Furthermore, a knowledge of the general job market helps workers know their worth and feel more encouraged by this knowledge. Still other studies have shown that career optimism not only makes the individual happier, but enhances their prospects of promotion and has a beneficial impact on work productivity as a whole.

Optimistic people seem to experience more work satisfaction than their less positive colleagues.

Those who believe themselves impostors, by contrast, report various negative thoughts and emotions and are more disposed to feelings of depression. On top of this, even if self-doubters are successful sometimes, they remain fearful of failing the next time and of being discovered as fakes. This establishes a cycle that prevents them from developing an optimistic perspective in the future.

"As the impostor phenomenon contains the fear of being exposed, it might be expedient to provide networking programs or supervision groups where sufferers have the chance to share their experiences and feelings without any blaming," says Dr. Neureiter. "Incorporating the impostor topic in support measures might enhance the reduction of impostor feelings as well as their negative effects."

Perhaps, as Dr Neureiter thinks, the first step to overcoming the impostor phenomenon and its negative consequences is for "suffering individuals to be encouraged to talk about their feelings."

Reference: Neureiter M and Traut-Mattausch E (2016) Inspecting the Dangers of Feeling like a Fake: An Empirical Investigation of the Impostor Phenomenon in the World of Work. Front. Psychol. 7:1445. doi: 10.3389/fpsyg.2016.01445

http://bit.ly/2g3if4S

Study reveals genetic explanation for cancer's higher incidence in males than females

A genetic explanation for the age-old conundrum of why cancer is more common in males

BOSTON -- In a new study, a group of Boston scientists, including researchers at Dana-Farber Cancer Institute, offer a genetic explanation for the age-old conundrum of why cancer is more common in males than females.

Females, it turns out, carry an extra copy of certain protective genes in their cells - an additional line of defense against the cells growing out of control - the investigators report in a paper published online today by Nature Genetics. Though not solely responsible for cancer's "bias" toward males, the duplicate copies likely account for some of the imbalance, including up to 80 percent of the excess male cases in some tumor types, report the study authors, based at Dana-Farber, the Broad Institute of Harvard and MIT, and Massachusetts General Hospital.

"Across virtually every type of cancer, occurrence rates are higher in males than in females. In some cases, the difference might be very small - just a few percent - but in certain cancers, incidence is two or three times higher in males," said Andrew Lane, MD, PhD, of Dana-Farber, the co-senior author of the study with Gad Getz, PhD, of the Broad Institute and Massachusetts General Hospital. "Data from the National Cancer Institute show that males carry about a 20 percent higher risk than females of developing cancer. That translates into 150,000 additional new cases of cancer in men every year."

Despite the size of the gap, the reasons for this divergence have been difficult to discern. The historic explanation - that men were more likely to smoke cigarettes and be exposed to hazardous chemicals in the work environment - has proven inadequate, because even as smoking rates have dropped and occupational patterns changed, men still outpace women in developing many cancers, including some associated with tobacco use such as kidney, renal, bladder, and oral cancers, Lane said. The disparity is present among boys and girls, as well as men and women.

Previous research found that in one form of leukemia, the cancer cells often carried a mutation in a gene called KDM6A, located on the X chromosome - one of the sex chromosomes that determine whether an individual is male or female. (Females cells carry two X chromosomes; males carry an X chromosome and a shorter, smaller Y chromosome.) If KDM6A is a tumor-suppressor gene - responsible for preventing cell division from spinning out of control - the mutation could lead to cancer by crippling that restraint system.

One might expect female cells to be just as vulnerable to the mutation. During embryo formation, one of the X chromosomes in female cells shuts down and remains off-line for life. A mutation in KDM6A on the active X chromosome, therefore, should lead to the same cell-division havoc as it does in males. Unexpectedly, KDM6A mutations were detected more often in male cancers. It turns out that some genes on the inactivated X chromosome in female cells "escape" that dormant state and function normally. One of those awakened genes happens to be a working copy of KDM6A. The "good" copy of the gene is sufficient to prevent the cell from turning cancerous.

The new study explored whether this phenomenon - fully functional tumor-suppressor genes on an otherwise idle X chromosome - underlies the broader phenomenon of cancer's partiality toward male cells. The researchers dubbed such genes "EXITS," for Escape from X-Inactivation Tumor Suppressors.

"Under this theory, one of the reasons cancer is more common in males is that male cells would need a harmful mutation in only one copy of an EXITS gene to turn cancerous," Lane said. "Female cells, by contrast, would need mutations in both copies."

To test this hypothesis, researchers at the Broad Institute scanned the genomes of more than 4,000 tumor samples, representing 21 different types of cancer, looking for various types of abnormalities, including mutations. They then examined whether any of the irregularities they found were more common in male cells or female cells.

The results were striking. Of nearly 800 genes found solely on the X chromosome, six were more frequently mutated - and incapacitated - in males than females. Of more than 18,000 other genes, none showed a gender imbalance in mutation rates.

Of the six genes more likely to be mutated in males, five were known to escape X chromosome inactivation, making them strong candidates to be EXITS genes.

"The fact that the very genes which are more often mutated in males are found exclusively on the X chromosome - and that several of them are known to be tumor-suppressors and escape X-inactivation - is compelling evidence of our theory," Lane remarked. "The protection afforded by the working copies of these genes in female cells may help explain the lower incidence of many cancers in women and girls."

One of the implications of the finding is that many cancers may arise through different molecular pathways in men and women. To circumvent the added genetic safeguards against cancer in female cells, tumors in women may employ alternate genetic circuits than in men.

To explore this possibility, the study authors recommend that future clinical studies of cancer treatments be "statistically powered" ¬- that is, involve enough patients and tumor tissue samples - to understand whether men and women respond differently to treatment because of genetic differences in their tumors.

The lead authors of the study are Andrew Dunford, of the Broad Institute and David M. Weinstock, MD, of Dana-Farber and the Broad Institute. Co-authors are Virginia Savova, PhD, John P. Cleary, Akinori Yoda, PhD, and Alexander A. Gimelbrant, PhD, of Dana-Farber; Steven E. Schumacher, MS, and Rameen Beroukhim, MD, PhD, of Dana-Farber and the Broad Institute; Timothy J. Sullivan, Julian M. Hess of the Broad Institute; and Michael S. Lawrence, PhD, of Massachusetts General.

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http://bit.ly/2fscP1F

A dash of hydrogen and methane could have kept Mars warm

A dash of hydrogen or methane in the atmosphere could have kept Mars warm enough for water to flow.

By Ken Croswell

Ever since the 1970s, we've known that chilly Mars must have once been warm enough for rivers. But we've struggled to explain how a world much farther from the sun than Earth is could get so warm – especially at a time when the sun was dimmer.

Today, the thin Martian atmosphere is mostly carbon dioxide, which is a greenhouse gas, but it traps little heat. Models suggest that even a thick CO2 atmosphere would not have lifted ancient Mars's temperature above the freezing point.

Now Robin Wordsworth of Harvard University and his colleagues have calculated that if just a few per cent of a mainly CO2 atmosphere is made up of molecules of hydrogen or methane it could make all the difference. When these gases collide with CO2 molecules, they absorb light in a key wavelength range, which allows the planet to retain enough heat that water can flow.

"It's really exciting," says James Kasting at Pennsylvania State University in University Park, whose own team has previously calculated that much more hydrogen than this would have been needed.

"We had to wave our arms a lot to justify that much hydrogen in the atmosphere," Kasting says. "This new paper allows that same hypothesis to work with a lot less arm waving."

As to whether it was hydrogen or methane that did the actual warming, Kasting says it probably depends on whether Mars ever spawned life. If it did, hydrogen-eating bacteria may have converted much of the atmospheric hydrogen into methane.

Journal reference: arxiv.org/abs/1610.09697

http://bit.ly/2fv3idu

AGS sets sights on better care, more responsive policies for 'unbefriended' older adults

Call for national effort to support older adults lacking designated decision-makers or not able to make medical decisions on their own

Experts call for 'national effort' supporting older adults who are already or might soon be 'unbefriended' -- a term for those who lack designated decision-makers and are no longer able to make medical decisions on their own

Experts at the American Geriatrics Society (AGS) today unveiled new guidance on care and decision-making for a unique and growing group of older adults: the "unbefriended." Proposed clinical practice and public policy changes would support some of society's most vulnerable individuals while also helping protect more of us from becoming unbefriended as we age.

The "unbefriended" lack the capacity to provide informed consent to medical treatment, often due to declines in physical and/or mental well-being. But these individuals face added challenges because they have no written outline of their care preferences and also have no identified "surrogate," such as a family member or friend, to assist in medical decision-making when needed. Baby boomers are at particular risk for becoming unbefriended, since more than 10 million boomers live alone and as many as 20 percent have no children.

"Health professionals have a special responsibility for the unbefriended, but we also face particularly challenging situations when it comes to their medical decisions" notes Timothy W. Farrell, MD, AGSF, a member of the expert panel responsible for the position statement. Added AGS President Ellen Flaherty, PhD, APRN, AGSF: "The AGS has outlined proactive steps we can take to help those at risk of becoming unbefriended. And for older adults who are already facing this reality, our guidance can help create standards and systems of support in more places and for more people. It's not just about improving care; it's about making care more respectful and responsive."

Across clinical practice, AGS experts have called for:

Avoiding ad hoc approaches to decision-making to ensure fairness and respect;

Identifying "non-traditional" surrogates--such as close friends, neighbors, or others who know a person well--wherever and whenever possible;

Putting mechanisms in place to assess decision-making capacity in a systematic fashion;

Standardizing approaches to caring for the unbefriended in urgent, life-threatening situations;

Ensuring access to decision-making surrogates who are familiar not only with a person's medical condition but also with his or her needs, preferences, and expectations; and

Remaining sensitive to all available information--including cultural factors--when considering an unbefriended person's best interests.

At a systemic level, AGS experts also recommend:

Bringing national stakeholders together to create model legal standards that could be adopted by all states;

Working with clinicians, healthcare organizations, and other stakeholders to prevent older adults from becoming unbefriended; and

Developing innovative, efficient, and accessible approaches to protect decision-making for the unbefriended.

As an update to earlier guidance released in 1996, the AGS Ethics Committee developed these new recommendations in collaboration with the AGS Clinical Practice and Models of Care Committee and the AGS Public Policy Committee.

The final position statement was published online ahead of print in the Journal of the American Geriatrics Society, and is available for free from GeriatricsCareOnline.org.

http://bit.ly/2fJ1PhB

Zika is no longer an emergency – it's worse than that, says WHO

WHO declares Zika virus no longer represents a public health emergency, but the threat is much worse

By Jessica Hamzelou

Zika virus no longer represents a public health emergency, the World Health Organisation announced on Friday. On the face of it, this sounds like good news. But this is not a downgrading of the threat of the virus – if anything, it's an upgrading, says Christian Lindmeier of the WHO.

The emergency status was used when little was known about Zika virus, and an urgent response was required from funders and researchers to learn more. "Today, we are in a very different situation," Peter Salama, head of the WHO's health emergencies programme, told a press briefing on Tuesday. Now that we know that Zika causes brain damage in fetuses and newborns, and that it is spreading, we need a long term approach. "It's critical that we recognise that Zika virus will continue to spread," he says. "And we need to continue to be able to respond."

From now on, the WHO's fight against Zika will be referred to as "a medium-to-long term programme of work". This means that research, diagnostics and treatment projects won't be able to get money from emergency funders. But these donors tend to only fund projects lasting around 6 to 12 months. The pressing questions surrounding Zika will take years of research to answer, says Salama. He hopes that funding will start to come from other, more sustainable donors. "In many ways, this is actually an acknowledgment that the programme needs to escalate into a longer term programme of work," he says.

Unknown risk

Some of the most burning questions surround the history of the virus itself. It is not clear if different strains of the virus may have different effects, for instance, or whether there are other factors that make an infection more or less dangerous for a pregnant woman. It is also unclear whether people who are infected with Zika – or other, similar viruses – might be somehow protected from future infections.

We still don't even know how many cases of Zika infection – and microcephaly in babies – there have actually been. For a start, 80 per cent of people infected with the virus don't show any symptoms. Around 2,100 cases of microcephaly in babies have been linked to Zika so far, but 3,000 more are currently under investigation. And babies that appear healthy at birth can develop microcephaly later on, and experience other problems in brain development. We're seeing that that definition of brain damage associated with Zika is expanding, says Salama, "so we may need to update whatever figure we give you today in terms of the risk."

Janet Daly at the University of Nottingham in the UK, agrees with the reclassification. She hopes that the change will mean that funding will be more equally spread among other infectious diseases. "The way in which funding was pumped into [Zika virus research] initially, even by countries that weren't affected, was great," she says. "But a lot of people said that diseases like dengue have been a problem for years, and perhaps the money should be more equally allocated," she says.

Vaccine hope

The WHO is also prioritising the hunt for a vaccine – one that can protect women of childbearing age, in particular. At the moment, there are around 30 potential candidates, but only a few have entered the earliest stages of clinical trials. "In all likelihood we are still a long way off having a commercially viable Zika vaccine," says Salama.

"With all viral diseases, vaccines are the ultimate goal," agrees Daly. But vaccines are never 100 per cent effective, and can mask the signs of disease, she says. It is also difficult to tell from a blood test whether someone has had an infection or a vaccination – making it harder to track a virus's spread. And a vaccine for one strain of a virus can make infections with other strains of the same virus worse. "It's really complicated," she says.

In the meantime, the WHO will seek out long-term funding to make progress. “In summary, Zika virus is here to stay,” says Salama.

http://tcrn.ch/2fvzCtO

Lab-made meat startup Memphis Meats hopes to grow a Thanksgiving turkey

Memphis Meats sizzled onto the startup stage earlier this year with a lab-grown meatball. Now, it’s entertaining the idea of growing other meats — including turkey.

Posted Nov 22, 2016 by Sarah Buhr (@sarahbuhr)

The startup has created an Indiegogo campaign to save some of the nearly 50 million birds from the slaughter each Thanksgiving by educating the public on what meat of the future could look and taste like.

While I am not crazy about posting Indiegogo campaigns, the company says this one is about getting the word out, not so much about raising funds to make turkey or other meats. In fact, Memphis Meats has already raised $3 million in seed funding to harvest animal cells and grow their meat in a petri dish.

The animal industrial complex is terrible for the planet and us, says Memphis Meats. It takes 660 gallons of water to produce one hamburger and, according to the CDC, raw meat is a major source of bacteria causing food-borne illnesses. So instead, the startup grows biologically identical meat in the lab, gathered from animal cells, essentially creating real meat, but cruelty-free and planet friendly.

Now Memphis Meats says it wants to get the market ready in time for its “clean meat” products to hit shelves in the next five years.

Memphis Meats definitely has its work cut out. I’ve asked several vegan friends in the past if they’d eat meat grown in a lab and most either said they weren’t sure or were grossed out by the idea. But cultured animal products like Memphis Meats might be perfect for meat lovers who don’t currently eat it because of concerns for health or the environment.

However, the startup acknowledges it will take some preparation to get some consumers on board and it’s asking supporters to donate to help the cause. The donations range in scale from $3 to $1,000. For a donation of $3 — the price of a typical fast food burger — Memphis Meats will name you as a “champion.” You could also get a sticker, a water bottle or a hoodie with the company logo on it, depending on the donation amount. The $1,000 level will get you all the swag plus your name on the website.

At this writing, Memphis Meats has raised more than $52,000 from nearly 700 backers to put turkey and other meats made from its Bay Area lab on shelves.

Though the Thanksgiving bird is probably a distant future project for the company, but there’s hope it could be sooner.

“The company will start with ground meats, but formed meats are on the roadmap, and could be chicken breast, steak, and even a whole turkey if the demand is there,” a company spokesperson told TechCrunch.

We were also able to obtain a video from the startup showing something like a piece of beef cooking on the grill. Will turkey be next? You can see the never-before-seen footage of the new beef fajita meat from Memphis Meats below:

http://nyti.ms/2fMo1r2

A Breakthrough in C-Section History: Beatrice of Bourbon’s Survival in 1337

What in the World

By HANA de GOEIJ NOV. 23, 2016

Births by cesarean section are so common these days that it is easy to forget what they were like before the advent of modern medicine: desperate gambits to save a baby by sacrificing the mother.

Cesarean births are mentioned in history and literature going back to antiquity, but the severe pain and stress, loss of blood and likelihood of infection usually added up to a death sentence for the woman, if she was not dead already.

When did all that start to change? When and where did both mother and child first survive a C-section?

Would you have guessed medieval Prague in the winter of 1337?

Neither would most historians, until a team of Czech researchers recently found an apparent case at the court of John the Blind, King of Bohemia and Count of Luxembourg.

John's second wife (and second cousin), Beatrice of Bourbon, gave birth to her only child, Duke Wenceslaus I, on Feb. 25, 1337. Beatrice, a teenage queen consort, had a pretty rough time of it, according to archival documents turned up by the researchers.

Beatrice of Bourbon **Credit National Library of France**

"Beatrice most likely passed out during delivery, and was believed dead," said one of the researchers, Dr. Antonin Parizek of Charles University in Prague, a noted obstetrician and expert on medical history. "The surgeons opened her only to save and baptize the child. The pain from the operation then likely led to her awakening."

At that point, he said, shock may have saved her life by keeping her from bleeding excessively.

Prague in the 14th century was a center of European learning, and the royal court of Bohemia would have employed the leading doctors of the time, a best-case scenario for Beatrice to recover from major abdominal surgery. And recover she did, to live 46 more years.

In a Flemish rhyming chronicle that was probably written by a diplomat at the court, the author "did not conceal his astonishment over a procedure when 'the duke was taken from his mother's body and the wound healed,'" Dr. Parizek said, adding that other archival sources described Beatrice "being opened up without dying."

"The event must have been truly uncommon, as information on the medical state of royals was not made public in those times," Dr. Parizek said. Though the evidence is indirect, he said, it "makes us believe that both the queen and her son survived a cesarean section."

Before the Czech study, the earliest documented case was in Switzerland in 1500. Some scholars see hints in religious texts that successful C-sections may have been performed as long ago as the second century A.D., using knowledge that was later lost, but Dr. Parizek is skeptical. "It is highly unlikely — there is no evidence," he said. "I would compare those interpretations to the story of Adam and Eve."

What about Julius Caesar, for whom the procedure is mistakenly said to have been named? No, historians say, he couldn't have been born that way — his mother survived.

http://slate.me/2ffXypw

Overly Cautious and Unscientific

From GMOs to pesticides, Europe's precautionary warnings aren't based on science.

By Marcel Kuntz

This story originally appeared on Slate.fr and has been translated, adapted, and republished here with permission.

Like many of my fellow researchers, for some years, I have observed the diminishing importance given to scientific facts, opening wide the information market to scaremongering. As an expert in plant biotechnology, I have become – involuntarily - well-trained in uncovering false science and claims distorted by ideology.

Okea/Thinkstock

Since the first cargo of genetically modified soybeans was delivered to the European continent in 1996, European scientists have continuously come under fire from an inseparable triad: activists at

war with the industrial society, the media fond of fearmongering, and the dark side of the internet. Well-funded activist groups have now extended their war against GMOs to the U.S. As in Europe, they initiated their campaign with their "right to know" slogan, while their real goal is to destroy a technology.

As a consequence, it becomes almost impossible for an ordinary citizen to distinguish truth from lies.

The European experience shows us that after GMOs, the same scare tactics are used against other technologies (nanotechnologies, electromagnetic radiation, etc.). As a consequence, it becomes almost impossible for an ordinary citizen to distinguish truth from lies. (And I consider myself to be "an ordinary citizen" for the many scientific fields in which I am not an expert.)

To help understand what is happening, I suggest the following classification of false sciences. At the bottom of the scale, we have (classical) pseudoscience, such as astrology, paranormal, unscientific medicines, etc. supported by an ancient community of believers. Generally, they do not attempt to undermine the foundation of science.

A second category is what the French historian Alexander Moatti termed *alterscience*s, mainly represented by individuals who have received scientific training and who use their knowledge to promote alternative theories or rebuild their own discipline. Even when alone against the rest of the scientific world, an "alterscientist" will claim he or she is right and seek recognition elsewhere, usually in the media. Moatti showed that this phenomenon has existed for centuries. Now, via the internet, an "alterscientist" can become an international hero. There are many recent examples of this in the activism against vaccines or chemicals.

A third category is what I call "parallel science," which is often used to serve a political project. Parallel science is what the tobacco industry used. Similarly, when the results of science are seen as a threat by the "advocates" of a political project, they may be tempted to create or invent their own "science" to create the evidence that suits them.

Parallel science is aided by fake research centers (claiming to be independent), colloquia with predetermined conclusions, "scientific" journals devoted to the cause—today, it is very easy to create a pseudoscientific journal on the internet—and occasionally heterodox publications passing through the sieve of true scientific journals (and which will be given wide publicity). All combine to create, for the nonspecialist, the appearance of science. False science, but real ballyhoo!

It would be wrong to believe that these phenomena only exist outside official institutions. The International Agency for Research on Cancer, a specialized agency of the World Health Organization, has exhibited questionable behavior. For example, IARC publishes a classification of substances, food, and occupational exposures into five categories ranging from "carcinogenic for humans" to "probably not carcinogenic for humans." Red meat is classified as "probably carcinogenic," which is absurd if one does not take into account the amount eaten on a regular basis: Indeed an excess can be deleterious, but reasonable consumption of meat is beneficial to health.

On the IARC website, one can actually read (highlighted in bold) that this classification "does not measure the likelihood that cancer will occur (technically called 'risk') as a result of exposure to the agent." Strangely, the expert working group at IARC did not attach this warning to its classification of the herbicide glyphosate as "probably carcinogenic." Glyphosate is in the same boat as red meat—its carcinogenicity depends entirely on the dose. At the levels used, the carcinogenicity of glyphosate has been refuted by the European Food Safety Authority, but rather than trying to explain the difference between what a substance *can do* and what it *actually does*—which could have been a way out of polemics for IARC—some of its officials preferred to formulate accusations against the EFSA. (There are details about the exchange of letters on the EFSA website.)

Today, many other scientific organizations (including another WHO organization) have contradicted IARC's position on glyphosate. Moreover, suspicions of (ideological) bias have surfaced against an editor of the report and other IARC officials. That IARC advised its experts not to disclose documents that were requested under U.S. freedom of information laws is doing little to build trust in its work.

Nevertheless, glyphosate use has been banned in some countries; it is still under the threat of a ban in the European Union. The latter has made non-science-based "precautions" a kind of new religion. If a corporation was insisting on such false claims to be made without scientific evidence, there would be outrage. But because the political power of this precautionary approach is stronger, the unscientific process is accepted.

As can be seen, we are far from a "knowledge-based society," a concept coined by some international organizations (such as the Organization of American States) and ... the European Union! The debate on the best way to protect science from ideological (or corporate) interference and how to share scientific knowledge deserves to be open. In the IARC/glyphosate case, Utah Rep. Jason Chaffetz, chairman of the U.S. House of Representatives Committee on Oversight and Government Reform, has asked a good question—namely whether taxpayers' money has been wasted on IARC. Why do I feel I already know the answer?

http://bit.ly/2fyvcFM

Harnessing the power of predatory bacteria as a 'living antibiotic'

Naturally occurring predatory bacterium able to work with the immune system to clear multi-drug resistant infections

A naturally occurring predatory bacterium is able to work with the immune system to clear multi-drug resistant Shigella infections in zebrafish, according to a study published today in Current Biology.

It is the first time the predatory bacterium Bdellovibrio bacteriovorus has been successfully used as an injected anti-bacterial therapy and represents an important step in the fight against drug-resistant infections, or 'superbugs'.

Shigella infection is responsible for over 160 million illnesses and over 1 million deaths every year - and is a common cause of 'travellers' diarrhoea.' Cases of drug-resistant Shigella are also on the rise as, although the diarrhoea usually clears up without treatment, antibiotics are often used even in mild cases to stop the diarrhoea faster. Resistance to antibiotics has prompted a team of researchers from Imperial College London and Nottingham University to look to the natural environment for creative solutions to this problem.

To investigate Bdellovibrio's ability to control drug resistant Gram-negative infections, researchers injected zebrafish larvae with a lethal dose of Shigella flexneri strain M90T, resistant to both streptomycin and carbenicillin antibiotics. Bdellovibrio was then injected into the larvae's infection site, and a decrease in the number of Shigella was seen. In the absence of Bdellovibrio, zebrafish were unable to control the replication of Shigella and levels of the bacteria rose.

Wellcome Research Career Development Fellow Dr Serge Mostowy, co-lead author from Imperial College London said: "This study really shows what a unique and interesting bacterium Bdellovibrio is as it presents this amazing natural synergy with the immune system and persists just long enough to kill prey bacteria before being naturally cleared. It's an important milestone in research into the use of a living antibiotic that could be used in animals and humans."

Bdellovibrio can invade and kill a range of Gram-negative bacteria, such as E. coli and Salmonella, in the natural environment. Previous research has shown that it can reduce pathogen numbers in the stomach of chickens when taken as an oral therapy, but there is growing need to develop therapies to target infections in wounds and organs. Successful use of Bdellovibrio highlights its potential uses in tackling a range of drug-resistant Gram-negative bacterial infections that can develop in hospital patients.

Professor Liz Sockett, co-lead author from The University of Nottingham said: "This has been a truly ground-breaking collaboration that shows therapeutic Bdellovibrio in action inside the translucent living zebrafish. The predatory action of the Bdellovibrio breaks the Shigella-pathogen cells and this stimulates the white blood cells; redoubling their 'efforts' against the pathogen and leading to increased survival of the zebrafish 'patients'."

Remarkably, Bdellovibrio is also able to reduce pathogen load in immunocompromised zebrafish larvae that have been depleted of white blood cells. However, survival is significantly greater in immune-competent zebrafish, showing that Bdellovibrio's maximum therapeutic benefit comes from its ability to work cooperatively with the host's own immune system.

Dr Michael Chew, Science Portfolio Advisor at Wellcome said: "It may be unusual to use a bacterium to get rid of another, but in the light of the looming threat from drug resistant infections the potential of beneficial bacteria-animal interactions should not be overlooked. We are increasingly relying on last line antibiotics, and this innovative study demonstrates how predatory bacteria could be an important additional tool to drugs in the fight against resistance."

This research was funded by Wellcome, the Lister Institute of Preventive Medicine, the Medical Research Council, The Leverhulme Trust, U.S. Army Research Office and the Defense Advanced Research Projects Agency.

Reference: The paper 'Injections of predatory bacteria work alongside host immune cells to treat Shigella infections in zebrafish larvae' is published in Current Biology: http://dx.doi.org/10.1016/j.cub.2016.09.067 (URL will go live when embargo lifts.)

http://bit.ly/2ffYn1R

New study reveals when West Antarctica's largest glacier started retreating

Thinning and retreat of Pine Island Glacier is part of a climate trend that was already underway as early as the 1940s

Reporting this week (Wednesday Nov. 23) in the journal Nature an international team led by British Antarctic Survey (BAS) explains that present-day thinning and retreat of Pine Island Glacier, one of the largest and fastest shrinking glaciers of the West Antarctic Ice Sheet, is part of a climate trend that was already underway as early as the 1940s.

It is already known that Pine Island Glacier -- roughly two-thirds the size of the UK -- has been thinning and retreating at an alarming rate since 1992 when satellite observations first started. The ice lost from this glacier and its neighbours, has added significantly to sea-level rise, and currently this area is one of biggest single unknowns in future projections. Until now, it was not known when the retreat of Pine Island Glacier started, or its underlying cause.

In this study, seabed sediment cores obtained from beneath the floating part of Pine Island Glacier have revealed that a cavity started to form beneath the shelf prior to the mid-1940s. This allowed warm sea water to flow under the shelf, and cause it to lift-off from a prominent sea-floor ridge which held it in place. This strongly suggests that current retreat was initiated by strong warming of the region associated with El Niño activity.

Lead author, marine geologist Dr James Smith from British Antarctic Survey, says:

'We are very excited about this new finding as it provides the first direct evidence of the timing of glacier retreat even before we had satellites to measure them. The sediment cores were obtained through a 450-m deep hole in of ice, and up to 500 m of ocean. The sediment reveals climate events that initiated the current thinning of Pine Island Glacier. They show us how changes half-way across the planet in the tropical Pacific, reached through the ocean to influence the Antarctic ice sheet.

"Pine Island Glacier is one of the most inhospitable and remote areas of Antarctica, so to get all the equipment needed to hot-water drill through the ice shelf required a major effort from our collaborators at the US Antarctic Programme. On the ground it was real team effort to lower the drill by hand to the seabed on nearly 1000 m of rope. After all that work, the cores show us something so unexpected."

Co-author and principal scientist Professor Bob Bindschadler of NASA says:

'A significant implication of our findings is that once an ice sheet retreat is set in motion it can continue for decades, even if what started gets no worse. It is possible that the changes we see today on Pine Island Glacier were essentially set in motion in the 1940s'.

Professor David Vaughan, co-author and Director of Science at British Antarctic Survey, says:

"Ice loss from this part of West Antarctica is already making a very significant contribution to global sea level rise, and is actually one of the largest uncertainties in global sea-level predictions. Understanding what initiated the current changes is one major piece of the jigsaw, and now we are already looking for the next -- how long will these changes continue and how much ice will Pine Island Glacier and its neighbours lose in the coming century? Data from the UK science programme iSTAR will tell us even more about Pine Island Glacier, but these are big questions that need the international science community to work together."

A new joint programme recently announced by the UK Natural Environment Research Council (NERC) and the US National Science Foundation will allow a more focussed study of Pine Island Glacier and provide a new opportunity to understand West Antarctica and quantify how much sea level rise it might cause in the coming century .

Sub-ice shelf sediments record 20th Century retreat history of Pine Island Glacier by Smith J.A, Anderson T.J, Shortt M, Gaffney A.M, Truffer M, Stanton T.P, Bindschadler R, Dutrieux P, Jenkins A, Hillenbrand C.D, Ehrmann W, Corr H.F.J, Farley N, Crowhust S, Vaughan D.G is published in the journal Nature on Wednesday 23 November.

http://bit.ly/2qp3M6j

People with Alzheimer's Disease Can Still Have Sharp Memories

Some older people who have signs of Alzheimer's disease in their brains may actually have pretty good memories, a small new study suggests.

By Agata Blaszczak-Boxe, Contributing Writer | November 23, 2016

In the study, researchers examined the brains of eight people who had died at ages 90 and older from various causes and found that some of them had signs of Alzheimer's disease. However, tests of their cognitive function that were conducted shortly before their death showed that these people had memories that were as good as those of healthy people who were 30 to 40 years younger.

The results suggest that some individuals with Alzheimer's disease may be protected against some of its symptoms, like memory problems, said lead study author Changiz Geula, a professor of cognitive neurology at Northwestern University Feinberg School of Medicine in Chicago, Illinois.

It is not clear why some people's brains and memories seem to be protected against such symptoms, but the researchers suspect that genetic and environmental factors may be at work, Geula told Live Science.

The eight people in the study were initially part of a larger study of individuals who died in their 90s and whose cognitive function was examined shortly before their death. The study participants also agreed to donate their brains to science after their death.

Based on the results of the cognitive-function tests that were conducted among the larger group before death, the researchers selected and looked at the brains of eight people whose memories were as good as those of healthy 50- to 60-year-olds. They detected physical signs of Alzheimer's disease, such as plaques and tangles, in three of those brains.

However, when the researchers examined the nerve cells in the hippocampus — a brain area that's associated with forming memories — it turned out that, in the brains of the three people with the good memory abilities, the cells in this area looked relatively normal. This is unusual for people who have the plaques and tangles in the brain that signify Alzheimer's disease, the researchers said. Usually, in people whose brains show evidence of plaques and tangles, the number of nerve cells in the hippocampus is reduced, Geula said.

This finding, which indicates that the nerve cells in the three people with superior memories have somehow been preserved, suggests that

the preservation of these cells might be one of the factors that helps to protect these people's memories, Geula said. However, its not clear that the preserved nerve cells were the cause of the people's good memory abilities — it's also possible that some other factor was responsible.

Moreover, if the preservation of these nerve cells is involved having a superior memory, it is likely not the only protective mechanism, he said. The researchers said that they think that certain genetic factors may also help to protect some people's brains against the symptoms of Alzheimer's disease.

It is also possible that a person's diet or the amount of time he or she spends exercising may help to protect the brain against Alzheimer's, although more research is needed before researchers can know whether this is true, Geula said. Future research is also needed to confirm the new findings in a larger sample of people, he said.

http://bit.ly/2qviZ3m

SpaceX wants to launch more satellites than are already in orbit

Satellite confetti

SPACEX is aiming for satellite domination. Elon Musk's space firm wants to launch more satellites than are currently in orbit, with the aim of delivering superfast broadband to the entire world.

The satellites will orbit at between 1150 and 1275 kilometres above Earth. SpaceX plans to kick things off with an initial constellation of 1600 satellites followed by a further 2825, all of which will be put into four orbital shells to improve coverage. Details of the plans emerged last week in an application to the US Federal Communications Commission.

Each satellite will be able to provide internet access for anyone within a 2120-kilometre-wide ellipse underneath its orbit. SpaceX says the satellites will provide internet speeds of 1 gigabit per second per user, which is around 200 times faster than average current speeds.

Once SpaceX has around 800 satellites in orbit, its internet service will cover the majority of the world, getting millions of people online.

Similar projects are being developed by Airbus, Virgin Galactic and Boeing, among others.

http://bit.ly/2fNXM3v

Current evidence does not support vitamin D supplements to prevent disease

Current evidence does not support the use of vitamin D supplements to prevent disease, conclude researchers in The BMJ today.

Associate Professor Mark Bolland and colleagues at the University of Auckland, New Zealand and the University of Aberdeen, Scotland say those at high risk of vitamin D deficiency should be advised about sunlight exposure and diet and offered low dose supplements, but the rest of us should focus on eating a healthy balanced diet with food containing vitamin D and getting regular short bursts of sunshine.

Vitamin D is made by the skin in response to sunlight. It helps to maintain calcium levels in the body to keep bones, teeth and muscles healthy. A lack of vitamin D can lead to bone deformities such as rickets in children, and bone pain and tenderness due a condition called osteomalacia in adults.

During spring and summer, most people get enough vitamin D from sunlight on their skin and their diet. But in autumn and winter, when exposure to sunshine is minimal, the only source is from a limited range of foods such as oily fish, egg yolk, red meat, liver, fortified breakfast cereals and fat spreads.

As such, Public Health England advises that everyone should consider a 10 microgram daily vitamin D supplement of during these months.

Based on a comprehensive search of published evidence, Associate Professor Bolland and colleagues make the case that existing clinical trials show that vitamin D supplementation does not improve musculoskeletal outcomes, such as falls or fractures.

They also say there is no high quality evidence to suggest that vitamin D supplementation is beneficial for other conditions such as heart

disease, stroke, and some cancers -- and ongoing trial results are unlikely to alter these conclusions.

If vitamin D supplementation does have benefits, they are most likely to be seen in severely deficient vitamin D populations, they write.

In light of the uncertainty, they suggest people at high risk should be counselled about sunlight exposure and diet, and low dose vitamin D supplements considered on an individual basis. "Otherwise we conclude that current evidence does not support the use of vitamin D supplementation to prevent disease."

In a debate article also published today, two experts discuss whether healthy people should take a vitamin D supplement during the winter months.

Dr Louis Levy, head of nutrition science at Public Health England, says advice to take a vitamin D supplement of 10 micrograms a day is backed by a Scientific Advisory Committee on Nutrition (SACN) review of the evidence on musculoskeletal health outcomes.

He says "Bolland and his colleagues conclude that serum 25-hydroxyvitamin D should not fall below 25 nmol/L, just like the Scientific Advisory Committee on Nutrition did earlier this year. To achieve this, PHE advice includes getting short bursts of summer sun and a balanced diet through summer and spring. But when the days are darker and shorter and sun exposure is minimal, people should consider a daily 10 microgram vitamin D supplement, as it's difficult to get enough through diet alone."

He argues that taking 10 micrograms of vitamin D daily to prevent musculoskeletal ill health "is unlikely to result in harmful levels of vitamin D" and says getting enough vitamin D is particularly important "because poor musculoskeletal health remains in the top 10 causes of disability adjusted life years."

But Tim Spector, Professor of genetic epidemiology at King's College London, questions whether this recommendation is evidence based. He points out that, despite hundreds of studies, "highly convincing evidence of a clear role of vitamin D does not exist for any outcome."

Although vitamin D treatment still has a role in people with proved deficiency or in high risk groups, "the rest of us should avoid being 'treated' for this pseudodisease, save scarce NHS resources, and focus on having a healthy lifestyle, sunshine, and a diversity of real food."

Practice: Should adults take vitamin D supplements to prevent disease?
http://www.bmj.com/cgi/doi/10.1136/bmj.6201
Head to Head: Should healthy people take a vitamin D supplement in winter months?
http://www.bmj.com/cgi/doi/10.1136/bmj.i6183

http://bit.ly/2fibK1t

Experts call for fair vaccine pricing, not 'random acts of charity'

Drug companies should stop using donations to atone those who cannot afford expensive vaccines and instead lower prices, argue experts in The BMJ today.

It follows a recent decision by Médecins Sans Frontières (MSF) to refuse a donation of one million doses of Pfizer's pneumonia vaccine for children caught in humanitarian emergencies. MSF judged it more important to press the company to lower the price that is the main obstacle to access.

Pfizer has since announced a special price for the vaccine to humanitarian organisations, in line with GSK, the other producer of this type of vaccine.

But in an editorial published today, Els Torreele at the Open Society Foundations in New York and Professor Mariana Mazzucato at the University of Sussex, argue that donations and benevolent price reductions for selected countries or populations "remain random acts of charity that do not get to the heart of the problem: the unacceptable commodification of human lives by drug companies using monopoly pricing power to determine who lives and who dies."

They point out that pneumonia vaccines are likely to cost less than a dollar to produce, but are typically being sold at $120-160 (£96-£130; €110-€150) per dose in wealthy countries, and at least three doses are required to protect a child. Pfizer's revenue from this vaccine was $6.2bn in 2015.

They explain that GSK and Pfizer have previously agreed to supply their vaccines at around $3 per dose to Gavi, a public-private partnership that works to increase access to vaccines in some 50 of the poorest countries.

"Though this has been applauded as an act of corporate social responsibility, they say the price "is still more than profitable, and there is no transparency around the cost structure of vaccine manufacture or company use of tax deductions to assess the true generosity of such offers."

As with expensive medicines, "high vaccine prices are the consequence of corporate decisions to focus on maximising shareholder returns at the expense of public health," they argue. "It is now clear that drug companies have identified vaccines as the next pot of gold."

So what is the reason behind this price hike, they ask?

In contrast to the medicines market, there are no generics for vaccines to drive down prices, giving even stronger pricing power to a small number of multinational vaccine producers, they explain.

As with medicines, the often cited justification for high vaccine prices is that research and development is expensive and risky, they add. Yet a detailed estimate of the development cost of rotavirus vaccines suggests that companies could recover all fixed costs quickly and offer these vaccines to all countries at affordable prices.

Instead, "they seek to fragment the market, selling in middle and high income countries in ways that maximise short term returns."

They call on companies to agree on a fair price that takes into account the research and manufacturing costs, the public research contributions, and the public health importance of vaccines. "This, rather than charitable donations meant to mask the system failures of a profit maximising healthcare economy, would be a beneficial corrective for public health," they say.

"The right price for vaccines must take into account the value of their collective creation but also the fact that they are essential goods produced collectively to safeguard the vulnerable - no matter where they live," they conclude.

Editorial: Fair vaccine pricing please, not random acts of charity
http://www.bmj.com/cgi/doi/10.1136/bmj.i6173

http://bit.ly/2fPuGk5

Hackers Turn Tesla Into a Brain-Controlled Car

A machine learning training program and an EEG headset turned brain activity into driving commands.

BY ALYSSA DANIGELIS

"Oh it's turning. Brake! Alright, we're scared but we're good."

The Tesla Model S had only gone a few feet, rolling mostly straight from one empty spot in the parking garage to another. The driver wasn't actually behind the wheel, though. He sat in the passenger's seat, donning an EEG headset that allowed him to control the vehicle with his mind. Meet Teslapathic.

This feat is the brainchild of California-based technologists Casey Spencer, Lorenzo Caoile, Vivek Vinodh and Abenezer Mamo. Their team used Spencer's 2015 Tesla Model S 85D for the hack, and their project placed third at the Cal Hacks event for university students this month.

The team only had 36 hours to make Teslapathic happen for the hackathon. In their setup, an EEG headset translates the brain activity for "stop" or "go" into analog signals broadcast by an off-the-shelf RC radio and articulated actuators on the pedals and a motor on the steering wheel, according to the team's description.

A machine learning training program turned the brain activity into specific commands. For "go," Spencer thought about tapping his right foot, and for "stop," he thought about clenching his left hand. The analog signal for "go" caused a linear actuator affixed to the brake pedal to recede, and the actuator on the gas pedal to engage. For "stop," it was the opposite.

Steering was slightly clunkier, and not brain-controlled. They installed a windshield wiper motor fitted with a potentiometer on the steering wheel. A head-mounted gyro for the driver provided some steering so

when the Spencer turned his head right or left, the steering wheel responded.

For safety, the code included an emergency brake in case of failure, the user had to hold a dead-man's switch in order to broadcast a signal, and a block wedged behind the accelerator prevented the Tesla from going too fast. And, at worst, the passenger could kick the actuators away from the pedals.

Granted, once it went, the Tesla wasn't quite between the lines and probably would have dinged the neighboring sedan if Spencer didn't think hard enough about stopping. But those few feet represent an incredible surge into the future.

A year ago, Spencer created a brain-controlled golf cart (video) dubbed the "Cranium Cart" for Cal Hacks. Potentially wrecking a golf cart isn't the same as risking a $85,000 Tesla, but Spencer clearly isn't afraid to put his car to the test. He is upfront about participating in Tesla's referral program, too, which probably helps.

In September 2015, he became the first person to break the 500-mile limit by going 550.3 miles on a single charge (video) going about 21 mph across two states with no stops. Earlier this year he pitted the Tesla against a 2015 BMW M4 (video).

"I especially love going the extra mile," Spencer wrote on his YouTube channel. "Mostly because it doesn't cost anything."

http://bbc.in/2fPrRQp

Egypt ancient city unearthed by archaeologists

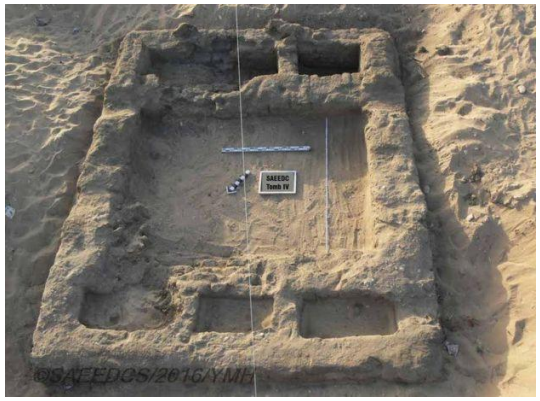
Archaeologists in Egypt have unearthed what they describe as a city that dates back more than 5,000 years, containing houses, tools, pottery and huge graves.

Experts say the size of the 15 newly discovered graves indicates the high social standing of those buried.

It is believed the city was home to important officials and tomb builders and would have flourished during early-era ancient Egyptian times.

The discovery comes at a time when the country is trying re-energise its tourism industry, which has suffered amid militant violence since President Hosni Mubarak was overthrown in 2011.

Archaeologists have made a range of finds in the newly-discovered city including buildings, shards of pottery and tools.



Egyptian Ministry of Antiquities

It is believed that this location was home to important officials and tomb builders who may have been engaged in the construction of royal graves in the nearby sacred city of Abydos - a place of many temples, and a capital in an early period of ancient Egyptian history.

The area is in the southern province of Sohag, in Upper Egypt, home also to the city of Luxor, one of the country's most popular tourist sites.

"About a mile behind where this material is said to be we have the necropolis with royal tombs going from before history to the period where we start getting royal names, we start getting identifiable kings," Prof Chris Eyre, an Egyptologist based at the University of Liverpool, told the BBC.

"So, this appears to be the town, the capital at the very beginning of Egyptian history."

The discovery was made by an archaeological mission that belongs to the country's Antiquities Ministry, and not a foreign group, officials quoted in Egypt Independent website said.

http://bit.ly/2gwv6qs

NHS does have the power to give HIV PrEP drug, say judges

High Court rules that NHS England does have the legal power to commission pre-exposure prophylaxis

By New Scientist staff and Press Association

NHS England has lost its appeal over a High Court ruling that it has the legal power to commission PrEP, a drug that has been shown to reduce the risk of HIV infection in people who are at high risk by more than 90 per cent.

PrEP, or "pre-exposure prophylaxis", is a prevention strategy which involves people who are at a high risk of HIV infection taking the anti-retroviral drug Truvada to protect them from the virus.

In May, a commissioning committee within NHS England decided not to commission PrEP, saying it lacked the power to do so under NHS legislation and regulations. NHS England has argued that it cannot legally commission PrEP, because the responsibility to arrange services that prevent the spread of HIV lies with local authorities.

Ending the epidemic

But the High Court ruled that NHS England does have the legal power to commission PrEP, a decision that has now been supported by three Court of Appeal judges, who decided to rule in favour of the National Aids Trust. "PrEP works, it saves money, and most importantly it has the power to prevent HIV acquisition for thousands of people, at the same time as beginning to end the HIV epidemic," says Deborah Gold, of the National Aids Trust. "This judgement brings that possibility one step closer."

It is expected that providing PrEP services could cost up to £20 million annually. The decision is expected to delay the provision of nine other new treatments and services by NHS England, including prosthetics for lower limb loss, hearing implants for children with auditory nerve problems, and drugs for some children with cystic fibrosis.

http://bit.ly/2qfUK8V

Let's Colonize Titan

Saturn's largest moon might be the only place beyond Earth where humans could live

By Charles Wohlforth, Amanda R. Hendrix on November 25, 2016

The idea of a human colony on Titan, a moon of Saturn, might sound crazy. Its temperature hovers at nearly 300° below zero Fahrenheit, and its skies rain methane and ethane that flow into hydrocarbon seas. Nevertheless, Titan could be the only place in the solar system where it makes sense to build a permanent, self-sufficient human settlement.

We reached this conclusion after looking at the planets in a new way: ecologically. We considered the habitat that human beings need and searched for those conditions in our celestial neighborhood.

Our colonization scenario, based on science, technology, politics and culture, presents a thought experiment for anyone who wants to think about the species' distant future.

We expect human nature to stay the same. Human beings of the future will have the same drives and needs we have now. Practically speaking, their home must have abundant energy, livable temperatures and protection from the rigors of space, including cosmic radiation, which new research suggests is unavoidably dangerous for biological beings like us.

Up to now, most researchers have looked at the Moon or Mars as the next step for human habitation. These destinations have the dual advantages of proximity and of not being clearly unrealistic as choices for where we should go. That second characteristic is lacking at the other bodies near us in the inner solar system, Mercury and Venus.

Mercury is too close to the sun, with temperature extremes and other physical conditions that seem hardly survivable. Venus's atmosphere is poisonous, crushingly heavy and furnace-hot, due to a run-away greenhouse effect. It might be possible to live suspended by balloons high in Venus's atmosphere, but we can't see how such a habitation would ever be self-sustaining.

But although the Moon and Mars look like comparatively reasonable destinations, they also have a deal-breaking problem. Neither is protected by a magnetosphere or atmosphere. Galactic Cosmic Rays, the energetic particles from distant supernovae, bombard the surfaces of the Moon and Mars, and people can't live long-term under the assault of GCRs.

The cancer-causing potential of this powerful radiation has long been known, although it remains poorly quantified. But research in the least two years has added a potentially more serious hazard: brain damage. GCRs include particles such as iron nuclei traveling at close to the speed of light that destroy brain tissue.

Exposing mice to this radiation at levels similar to those found in space caused brain damage and loss of cognitive abilities, according to a study published last year by Vipan K. Parihar and colleagues in Science Advances. That research suggests we aren't ready to send astronauts to Mars for a visit, much less to live there.

On Earth, we are shielded from GCRs by water in the atmosphere. But it takes two meters of water to block half of the GCRs present in unprotected space. Practically, a Moon or Mars settlement would have to be built underground to be safe from this radiation.

Underground shelter is hard to build and not flexible or easy to expand. Settlers would need enormous excavations for room to supply all their needs for food, manufacturing and daily life. We ask why they would go to that trouble. We can live underground on Earth. What's the advantage to doing so on Mars?

Beyond Mars, the next potential home is among the moons of Jupiter and Saturn. There are dozens of choices among them, but the winner is obvious. Titan is the most Earthlike body other than our original home.

Titan is the only other body in the solar system with liquid on the surface, with its lakes of methane and ethane that look startlingly like water bodies on Earth. It rains methane on Titan, occasionally filling swamps. Dunes of solid hydrocarbons look remarkably like Earth's sand dunes.

For protection from radiation, Titan has a nitrogen atmosphere 50 percent thicker than Earth's. Saturn's magnetosphere also provides shelter. On the surface, vast quantities of hydrocarbons in solid and liquid form lie ready to be used for energy. Although the atmosphere lacks oxygen, water ice just below the surface could be used to provide oxygen for breathing and to combust hydrocarbons as fuel.

It's cold on Titan, at -180°C (-291°F), but thanks to its thick atmosphere, residents wouldn't need pressure suits—just warm clothing and respirators. Housing could be made of plastic produced from the unlimited resources harvested on the surface, and could consist of domes inflated by warm oxygen and nitrogen. The ease of construction would allow huge indoor spaces.

Titanians (as we call them) wouldn't have to spend all their time inside. The recreational opportunities on Titan are unique. For example, you could fly. The weak gravity—similar to the Moon's—combined with the thick atmosphere would allow individuals to aviate with wings on their backs. If the wings fall off, no worry, landing will be easy. Terminal velocity on Titan is a tenth that found on the Earth.

How will we get there? Currently, we can't. Unfortunately, we probably can't get to Mars safely, either, without faster propulsion to limit the time in space and associated GCR dosage before astronauts are unduly harmed. We will need faster propulsion to Mars or Titan. For Titan, much faster, as the trip currently takes seven years.

There is no quick way to move off the Earth. We will have to solve our problems here. But if our species continues to invest in the pure science of space exploration and the stretch technology needed to preserve human health in space, people will eventually live on Titan.

Charles Wohlforth and Amanda Hendrix are the authors of Beyond Earth: Our Path to a New Home in the Planets

http://bit.ly/2fPuW2O

Language trends run in mysterious 14-year cycles

Words move in and out of favour over 14 years

By Sophia Chen

The media tends to interpret culture in yearly cycles. Critics publish end-of-year best-of lists and Oxford Dictionaries just selected "post-truth" as its word of the year. But the words we use actually seem to operate on a 14-year cycle, an analysis has found.

Marcelo Montemurro at the University of Manchester, UK, and Damián Zanette at Argentina's National Council for Scientific and Technical Research identified 5630 commonly used nouns and analysed how their popularity changed over the last three centuries.

To do this, they wrote computer scripts to dig through Google Ngram, a database of the words used in nearly five million digitised books. They then ranked the nouns in order of popularity and tracked how their rankings changed from 1700 to 2008.

A curious pattern emerged. They found that English words rose in popularity and then fell out of favour in cycles of about 14 years, although cycles over the past century have tended to be a year or two longer. They also found evidence of cycles of this length in French, German, Italian, Russian and Spanish. The popularity of related nouns – such as king, queen and duchess – tended to rise and fall together over time.

Some cycles appear to coincide with historical events. For example, large swaths of words declined in popularity in the years around the world wars. Although the reason for this is unclear, Montemurro thinks it could be related to political trends.

Generation gap?

These results support previous work that suggests that language evolves in a patterned way, similar to the way genes are transmitted from parent to offspring, says Mark Pagel at the University of Reading, UK. "Language is not all over the place," he says. "It's remarkably consistent."

However, Pagel says the researchers still need to completely rule out these cycles being a statistical fluke.

"It's fascinating to look for cultural factors that might affect this, but we also expect certain periodicities from random fluctuations," he says. "Now and then, a word like 'apple' is going to be written more, and its popularity will go up. But then it'll fall back to a long-term average."

However, if something does lie behind the cycle, its 14-year duration is puzzling. Some baby names have been found to move in and out of popularity over roughly the length of a human generation. But with nouns, Pagel doesn't see an obvious cultural connection. "It doesn't fit the human life history," he says. "There's no particular reason why it should be 14 years."

Montemurro admits that the significance of the cycle's length remains unclear, but he thinks this is due to more than chance. "It's very difficult to imagine a random phenomenon that will give you this pattern," he says.

And he thinks that further study of the cycle could reveal insights about human behaviour and the nature of fashion and trends. "Assuming these patterns reflect some cultural dynamics, I hope this develops into better understanding of why we change the topics we discuss," Montemurro says. "We might learn why writers get tired of the same thing and choose something new."

Journal reference: Palgrave Communications, DOI: 10.1057/palcomms.2016.84

http://nyti.ms/2qrXZqh

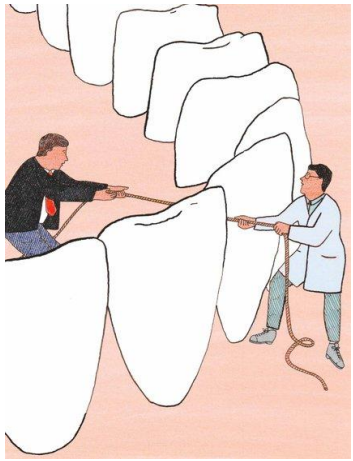
Flossing and the Art of Scientific Investigation

Expertise has come under fire from would-be defenders of science

By JAMIE HOLMES NOV. 25, 2016

It's bad enough that expertise is under attack these days from populist political movements that dismiss specialist opinion as just another establishment ruse. But lately expertise is being criticized from another direction, too — from would-be defenders of science.

Consider the recent controversy over flossing. In August, a widely read Associated Press report suggested that, contrary to the advice of dentists everywhere, flossing didn't necessarily foster good oral health. The report looked at 25 studies that had generally compared toothbrushing and flossing with toothbrushing alone and concluded that the evidence for the benefits of flossing was weak.



Credit Marion Fayolle

In response, the Department of Health and Human services, the American Dental Association and the Academy of General Dentistry reaffirmed the importance of interdental cleaning. But confusion persists: A lot of people now mistakenly think that "science" doesn't support flossing.

What explains this confusion? Misconceptions about the relation between scientific research, evidence and expertise.

In the case of flossing's benefits, the supposedly weak evidence cited by The Associated Press was the absence of support in the form of definitive randomized controlled trials, the so-called gold standard for scientific research. Why was there so little of this support? Because the kind of long-term randomized controlled trial needed to properly evaluate flossing is hardly, if ever, conducted — because such studies are hard to implement. For one thing, it's unlikely that an Institutional Review Board would approve as ethical a trial in which, for example, people don't floss for three years. It's considered unethical to run randomized controlled trials without genuine uncertainty among experts regarding what works.

And dentists know from a range of evidence, including clinical experience, that interdental cleaning is critical to oral health and that flossing, properly done, works. Yet the notion has taken hold that such expertise is fatally subjective and that only randomized controlled trials provide real knowledge.

The opposition between randomized controlled trials and expert opinion was fueled by the rise in the 1990s of the evidence-based medicine movement, which placed such trials atop a hierarchy of scientific methods, with expert opinion situated at the bottom. The doctor David Sackett, a father of the movement, once wrote that "progress towards the truth is impaired in the presence of an expert."

But while all doctors agree about the importance of gauging the quality of evidence, many feel that a hierarchy of methods is simplistic. As the doctor Mark Tonelli has argued, distinct forms of knowledge can't be judged by the same standards: what a patient prefers on the basis of personal experience; what a doctor thinks on the basis of clinical experience; and what clinical research has discovered — each of these is valuable in its own way. While scientists concur that randomized trials are ideal for evaluating the average effects of treatments, such precision isn't necessary when the benefits are obvious or clear from other data.

Clinical expertise and rigorous evaluation also differ in their utility at different stages of scientific inquiry. For discovery and explanation, as the clinical epidemiologist Jan Vandenbroucke has argued, practitioners' instincts, observations and case studies are most useful, whereas randomized controlled trials are least useful. Expertise and systematic evaluation are partners, not rivals.

Distrusting expertise makes it easy to confuse an absence of randomized evaluations with an absence of knowledge. And this leads to the false belief that knowledge of what works in social policy, education or fighting terrorism can come only from randomized evaluations. But by that logic (as a spoof scientific article claimed), we don't know if parachutes really work because we have no randomized controlled trials of them.

Antagonism toward expertise can also waste time and effort by spurring researchers to test the efficacy of things we already know

work. In the field of international development, for example, a recent study investigated the relationship between prescription glasses and school performance. A randomly selected group of Chinese children with poor eyesight were given glasses … and subsequently got better grades. Imagine: Kids who could see did better in school!

The cult of randomized controlled trials also neglects a rich body of potential hypotheses. In the field of talk therapy, for example, many psychologists believe that dismissing a century of clinical observation and knowledge as anecdotal, as research-driven schools like cognitive behavioral therapy have sometimes done, has weakened the bonds between clinical discovery and scholarly evaluation. The psychiatrist Drew Westen says the field is too often testing "uninformed hunches," rather than ideas that therapists have developed over years of actual practice.

Experiments, of course, are invaluable and have, in the past, shown the consensus opinion of experts to be wrong. But those who fetishize this methodology, as the flossing example shows, can also impair progress toward the truth. A strong demand for evidence is a good thing. But nurturing a more nuanced view of expertise should be part of that demand.

Jamie Holmes, a fellow at New America, is the author of "Nonsense: The Power of Not Knowing."

http://dailym.ai/2fBruYC

How scientists may have cracked a cure for the common cold

A simple nasal spray may be the cutting edge solution we have all been waiting for

By Lucy Elkins for Daily Mail

Dressed in a pristine lab coat, the scientist snaps on a pair of surgical gloves and purposefully approaches the young man sitting in front of him. He puts a quick squirt of spray up the volunteer's nostril …and his work is done. Now all there is to do is watch and wait.

It might not sound cutting edge, but it is. For in this slightly shabby Victorian building in Paddington, London, researchers could be on the cusp of a breakthrough.

The innocuous looking liquid being sprayed up the young man's nose is a potential vaccine to prevent the common cold. It has been shown to work in mice and rats, stopping them becoming infected with the common cold — and it's being tested in humans.

A cure for the common cold is one of medicine's holy grails. It's something that has eluded scientists for decades, partly because there isn't just one virus that can cause colds.

In fact, there are around 200, though most colds are caused by three: the rhinovirus, coronavirus and respiratory syncytial virus (RSV), which are responsible for 80 per cent of colds.

'That makes it very hard to find a vaccine that would work against them all or a treatment that could work for them all,' says Peter Openshaw, a professor of experimental medicine at Imperial College London, who has spent the past 30 years researching colds and flu.

'But I think we are on the verge of it, I really do.'

Professor Openshaw heads a team that is testing the new nasal spray vaccine SynGEM, produced by Mucosis, a Dutch biotechnology company. They are waiting to see if the 36 volunteers they are testing it on produce antibodies — immune cells that kill the cold virus when it enters the body. This will be the sign that the vaccine works.

It's a nerve-racking time for the team as it has taken many years and a great deal of hard work to get to this point. The stakes are high.

Colds can kill the vulnerable

It's easy to forget that what can be 'just a cold' for many of us can have a devastating impact on others. 'Colds can and do kill,' says Professor Openshaw. 'Every year, there are many winter deaths, some of which are due to flu, but others are due to common cold viruses that can be fatal to the weak and the vulnerable.'

Normally this is through complications such as pneumonia (inflammation of the lung), but some forms of cold can prove

particularly dangerous to babies. More infants are hospitalised by a cold than by any other illness.

And even if a cold is not life-threatening, it can be life-changing, says Dr Christopher Chiu, a senior lecturer and honorary consultant in infectious diseases at Imperial. 'If an elderly person with pre-existing lung disease who is frail and only just coping at home gets a cold, this might be the thing that leads to a deterioration of their condition. It not only leads to them being hospitalised, but also to their not being able to return home to their independent life.'

So the hunt for a cure is no idle one, and in their cold labs, the scientists at Imperial — one of the leading cold research centres in the UK — have investigated everything from the number of anti-bodies we produce when we catch a sniffle to the amount of nasal mucus we release at the peak of infection.

Measuring mucus might sound like schoolboy antics, yet this research is important as mucus is crucial to the way the virus spreads.

'Under lab conditions, cold viruses are hard to transmit, but in nature they travel excellently,' says Professor Openshaw. 'It may be that something in the mucus synergises with the virus to help it travel.'

Further down the corridor from the wards where the volunteers are receiving their nasal vaccines, Dr Fiona Culley, a lecturer in respiratory infections, is investigating why older people react to a cold so badly.

She is instructing a PhD student in the fiddly job of giving a mouse a cold. 'Mice seem to age in a similar way to humans,' she says. 'They go grey, they lose their hair, they put on fat around their middle, they can go a bit deaf — and we think their lungs age in the same way ours do, too. 'A mouse that's 18 months old is the equivalent of 65 to 70 years in human terms, and we study them to see how they react when they have the cold virus.'

Everyone on the team is aware of the impact a cold can have, and they take no chances. While they don't wear the biohazard suits they would if they were handling Ebola or SARS (another highly infectious virus), they wear coats, gloves and goggles. It may just be the cold virus, but it is kept safely at arm's length.

'All of the infectious material is kept in flow hoods — cabinets designed to create a flow pattern of air that keeps you away from the cultures,' says Professor Openshaw, pointing at what looks like a kitchen extractor fan.

'When you work with these viruses you learn to treat them with respect,' says Dr Culley. 'They have so many tricks to help them evade our immune system — you really have to admire them.'

Professor Openshaw, who is president of the British Society for Immunology, adds: 'Their strategy is to cause a rapid illness and then move on. They use humans as a parasite would — to find someone else to infect.'

Dangers of a bedside table

Cold viruses enter the body as infected droplets sneezed out by another person. They are inhaled or picked up from infected surfaces.

Touch your face, nose or eye, and the virus can find its way down a tear duct to settle in the moist nasal passages where it invades the nasal cells and starts to replicate.

'A cold virus can survive for hours on a surface, depending on the temperature and the amount of UV light,' says Profesor Openshaw. 'Winter viruses in particular don't like UV light. 'They find clothing favourable and bedside tables are an issue, especially in hospitals — probably because people leave dirty tissues on them.

'Knowing what I know, I always wash my hands when I have been on public transport or anywhere where people are sneezing.'

Indeed, all the team are diligent about hand-washing at work and home, especially after mixing with large groups of people.

Nasal spray may hit the spot

Each cold virus has its preferred environment in your body.

'Some have more of a focus on the nose and throat, partly because they prefer the lower temperature there, which is 32c,' says Professor Openshaw. 'That's why some colds tend to cause more nasal-type

symptoms, such as a runny nose and pain behind the sinuses. ‘Others prefer a warmer temperature — 37c — found in the lungs. 'Influenza, for example, which is a form of common cold virus, prefers this kind of environment and tends to cause fewer nasal symptoms and more shivers and aches.’

Many of the symptoms are the immune system’s reaction to the virus. Mucus, for example, is produced to try to capture the virus and stop it infiltrating the body’s cells. The blocked nose is due to immune cells racing to the area — but in doing so they cause inflammation in the nasal passages. The aches are the result of the cytokine storm — the flood of immune cells produced to combat the infection, but which also cause inflammation in muscles and joints.

But the Imperial team hope the new vaccine could halt the cold before it’s begun. ‘Previous studies for a new vaccine looked at immune cells, or antibodies, in the blood to see how people reacted to cold infections,’ says Dr Chiu.

‘However, we have found that when antibodies get to the lung or nose, they look totally different and not like their counterparts in the blood.’

Most vaccines are given by injection into the muscle, so the cells that are activated are mainly in the blood. The new understanding about these antibodies in the lungs and nose means scientists have to re-think where the vaccine is given.

‘Now it is clear that if you want to fight (respiratory) infections, the vaccine needs to be nearer to the site of the infection,’ says Dr Chui.

And that, he says, means giving it as a nasal spray. ‘This will make antibodies in the nose, so they can kill the virus before it starts to replicate.’

One plan is that the new vaccine — designed to halt RSV — would be targeted at older people or school-age children, who are responsible for much of the spread of infection. ‘Severe chest infections in babies especially, but also in the elderly, are more frequently caused by RSV than most other cold viruses,’ says Dr Chiu.

If the initial tests prove that the vaccine does stimulate the production of antibodies, they will start vaccinating and then infecting volunteers with RSV early next year. If successful, the vaccine could be available in around five years.

How colds lead to infections

As we talk, Dr Chiu explains one of the apparent contradictions of a cold: how is it that when you first go to the GP with symptoms, you’re told it’s just a virus and you don’t need antibiotics?

Then you go back a week later, feeling worse, and are told you do need antibiotics because it’s now a bacterial infection.

In fact, it’s simple, says Dr Chiu: ‘Cold viruses, once established in the nose, may in some people then disperse to the lungs.’ The virus may destroy some of the cells in the airway and affect the immune system. ‘After the damage done by the virus, bacteria are able to easily follow,’ he says. ‘That’s why severe lung infections can follow a cold.’ Some cold viruses — RSV in particular — are more likely to travel to the lungs.

Anyone with impaired immunity, such as those with poorly controlled diabetes (high blood sugar suppresses the immune system) or taking medications such as steroids or chemotherapy (which suppress the immune system), are vulnerable to lung complications after a cold, as are smokers and asthmatics. The Imperial scientists hope their study of work with the nasal spray volunteers could also help them understand another conundrum about the cold.

With many cold viruses, your body has an antibody to it once you have been infected and you are protected, says Professor Openshaw. However, RSV is able to re-infect people several times over. That’s because it is able to trigger a kind of amnesia in the immune system, so it’s unable to make antibodies the next time a virus strikes.

It means you are re-infected throughout your lifetime – ‘on average, once every three to five years,’ says Professor Openshaw.

The problem is that RSV causes a particularly unpleasant cold for babies, which is why Dr Culley is working alongside colleagues who take mucus samples from babies' noses while they're on the ward.

'We have a paediatric care unit that every winter becomes full of babies who were born healthy, but have caught a cold virus and became very ill. As yet we don't know why,' she says.

The 'cure' that already exists

Yet, remarkably, there is already a treatment. It is given to at-risk babies to help prevent RSV. It's been around for a few years, though you are unlikely to have heard of it.

Palivizumab is given as monthly injections from October to March to protect at-risk infants, such as premature babies, with under-developed lungs against RSV. It is a form of antibody that stops the virus from entering the child's cells and it can reduce the risk of hospitalisation by as much as 45 per cent, according to UK studies.

Over 2,000 babies in England receive Palivizumab each year. 'However, it is very expensive so it is only given to high-risk children,' says Dr Culley. A 50mg vial costs in the region of £300 and though arguably some adults would be prepared to pay this to avoid a cold, they are unlikely to benefit as much because RSV does not pose such a threat to them.

Given that colds can be so dangerous for babies, it might sound counter-intuitive to limit its use. But at Imperial and elsewhere, they are also investigating whether having colds in early childhood may actually lead to stronger lungs. The key is the type of cold.

'It has to be a non-wheezy cold and this seems to be associated with better lung health in later life,' says Professor Openshaw.

But the cold remains something of a poor relation in the research world, he says, not commanding the investment or the interest of other more exciting conditions. 'Attracting money for research into the common cold is not always that easy,' he adds wryly.

http://bit.ly/2qv6UtI

Eating Ice Cream For Breakfast May Improve Mental Performance And Alertness, Study Says

Most parents would consider it a crime to give a child ice cream for breakfast.

By Janice Williams @manhattanjan On 11/26/16 AT 9:16 AM

But they might rethink allowing their kids to have a scoop of the cold, sweet treat first thing in the morning, if they knew it could make them smarter. Although an early morning sugar rush may be parents and teachers worst fears, a new study recently found eating ice cream first thing in the morning can actually be beneficial for the brain. The study, published by Kyorin University professor Yoshihiko Koga, said eating ice cream right after waking up can result in improved instances of alertness and mental performance.

The study, which was published on Japan's Excite News website Tuesday, compared participant's brain activity in people who had been given ice cream immediately after waking up with those who had not eaten ice cream. Koga found that people who had consumed ice cream for breakfast showed better reaction time and were able to process information better than those who did not have the ice cream. Further tests of brain activity also showed that the people who had ice cream first thing in the morning had an increase in high-frequency alpha waves, which are associated with higher levels of alertness and can reduce mental irritation, the report said.

Subjects were tested a second time, during which they were given cold water instead of ice cream immediately after waking up. Although the results from that particular test did show higher levels of alertness and mental capacity, people who had ice cream for breakfast showed significantly higher mental stimulation.

More research still needs to be conducted to thoroughly determine what specific ingredient in ice cream could be responsible for the mental boost. Koga said in the report that he is also hoping to

determine if ice cream is a trigger for positive emotion and higher levels of energy.

As for the sugar high that may come along after eating ice cream for breakfast, that may also be something worth reconsidering, according to a 1994 study that tested the affects of sugar on a group of children and found that sugar doesn't actually change behavior or affect cognitive skills.

http://bit.ly/2qv8WtU

Homeopathic Medicine Labels Now Must State Products Do Not Work

U.S. trade agency requires products say there is no scientific evidence for effectiveness

By Emma Stoye, Chemistry World on November 27, 2016

Over the counter homeopathic remedies sold in the US will now have to come with a warning that they are based on outdated theories 'not accepted by most modern medical experts' and that 'there is no scientific evidence the product works'. Failure to do so will mean the makers of homeopathic remedies will risk running afoul of the US Federal Trade Commission (FTC).

The agency argues that unsupported health claims included in the marketing for some of these remedies are in breach of laws that prohibit deceptive advertising or labelling of over the counter drugs.

The body has released an enforcement policy statement clarifying that homeopathic drugs are not exempt from rules that apply to other health products when it comes to claims of efficacy and should not be treated differently. In order for any claims in adverts or on packaging not to be 'misleading' to consumers it should be clearly communicated that they are based on theories developed in the 1700s and that there is a lack of evidence to back them up, the statement says. It adds that the FTC will 'carefully scrutinise the net impression of [over the counter] homeopathic advertising or other marketing … to ensure that it adequately conveys the extremely limited nature of the health claim being asserted'.

http://tcrn.ch/2fWaqX3

Disrupting the world of science publishing

ScienceMatters is offering an open-source publishing platform to every scientist who wants to share his or her observations

Bérénice Magistretti Crunch Network Contributor

Every scientist wants his or her paper to appear in Cell, Nature or Science. In today's scientific world, being associated with such publications is synonymous with prestige and excellence, opening doors to top positions and coveted awards.

Nonetheless, these journals are typically known to have an acceptance rate of 5-10 percent, meaning that the other 90-95 percent whose papers have been rejected are forced to find other publishing outlets that simply don't have the same alluring impact within the academic world.

ScienceMatters, a Swiss startup that launched in February, is trying to pave the way to a more democratized system by offering an open-source publishing platform to every scientist who wants to share his or her observations. "We are trying to publish the same way top science publications published 50 years ago," explains Lawrence Rajendran, founder and CEO of ScienceMatters. "They used to publish exact observations, but now, competition for space is extremely high so there needs to be that wow factor."

In other words, scientists must not only present outstanding and unique results, but they also need to craft them within an appealing narrative that pleases the editors. Therefore what drives scientists today is no longer the curiosity of discovering something new, but rather the glorification of a high-impact factor (i.e. essentially an indicator of the number of times articles published in the journal are cited).

"It has been repeatedly said that the impact factor of a journal cannot be considered as the only proxy for the quality of the work it publishes," says Monica Di Luca, vice rector of the University of Milan. "However, the fact is that universities and research centers all

use this measure when hiring and promoting researchers. Even scientists consider it a useful means to assess the scientific status of a colleague."

As a neuroscientist himself, Rajendran experienced first-hand the biased and unjust system that constitutes the world of science publishing when he was a post-doc. "This publish or perish culture instills a hostile scientific environment, pressuring young researchers to outperform their peers, which can lead to data fraud," he explains. Born in a slum around Madras, India, this University of Zurich professor decided to build an inclusive platform for all scientists, whether they're full professors at Harvard or post-docs in Mumbai.

To publish on ScienceMatters, the scientist needs to demonstrate two things. First, the research has to be technically solid (i.e. proper controls and execution). Second, it has to have a scientific context (i.e. neuroscience, chemistry, physics…). Once the paper has been submitted, it goes through a triple blind review process where both the authors and the editors are anonymous. "This prevents any form of bias as we believe science alone should matter," says Rajendran.

There are other open-access platforms that are on a similar quest of democratizing the world of science publishing. One of them, eLife, was founded by Nobel Laureate Randy Schekman, who famously denounced Cell, Nature and Science for their selection criteria. The Guardian quoted him saying: "Just as Wall Street needs to break the hold of bonus culture, so science must break the tyranny of the luxury journals." Frontiers, also based in Switzerland, is another open-source publishing platform for scientists.

"I don't think journals like eLife or Frontiers are fundamentally different from, let's say, Cell Reports or Nature Communications," explains Stanford-based professor Tom Südhof, Nobel Laureate and chair of ScienceMatters' board of advisors. "I think ScienceMatters breaks this mold, at least partly, by publishing short pieces that are not stories, but simply results."

These results are incorporated in MattericTM (patented in 2015), a metric system that provides scores on how impactful an observation is using network-based algorithms. "Taken together, the vision of ScienceMatters is to create an internet of validated science," explains Rajendran. The hope, according to the CEO, is to become the "Google of Science," indexing every research paper to render the whole system more transparent and accessible.

"A new metric is exactly what we need," says Di Luca. "But we also need this metric to be shared among peers and endorsed by scientific societies or structured funding agencies." The Swiss startup seems to be on the right track, as it was recently accelerated by MassChallenge Switzerland and recognized by the European Commission. Thanks to its recent seed round of $380,000, led by the Velux Foundation, the team has managed to fund submissions — a stark contrast to other journals that impose a publishing fee.

ScienceMatters has published around 60 papers since its launch, each from multiple authors and more than 600 editors behind the review process. "We are now negotiating with universities so that they can take care of the publishing charges for their authors," explains Rajendran. They have already confirmed partnerships with the University of Zurich, the University of Bern and the Swiss Federal Institute of Technology (EPFL) in Lausanne.

The team now wishes to raise additional funds to expand the platform's reach. "We are looking for VCs, impact investors, philanthropists or charitable foundations who believe in this idea and who don't want a rapid exit," says the CEO. "We want to keep growing and, who knows, maybe even become a publishing company."

http://bit.ly/2qa35xb

Abe orders review of drug pricing system by year-end

Prime Minister Shinzo Abe has instructed his cabinet ministers to review the pricing system for drugs and draw up a basic policy by the end of the year in a bid to curb ballooning medical costs.

TOKYO — “I’d like to have the Council (on Economic and Fiscal Policy) compile a basic policy before the year’s end to fundamentally reform the drug pricing system,” Abe said at a meeting of the council.

At the gathering, health minister Yasuhisa Shiozaki unveiled a plan to review the prices of in-demand drugs up to four times a year. Under Japan’s present health system, drug prices are reviewed once every two years.

Abe made the remarks after private-sector panel members proposed that drug prices should be revised every year rather than every two years. The members said Japan needs a rule for lowering drug prices as demand by patients is expected to increase in the future with the graying of its population.

The move came after the government took the extraordinary measure of halving the price of the highly expensive cancer medication Opdivo from February next year, as a surge in users and attendant medical costs had raised fears of burdening the public health insurance system..

Opdivo, also known as Nivolumab, was initially marketed in Japan in 2014 as a drug to treat melanoma, a type of skin cancer. The drug draw strong demand after it was also found to be effective in treating lung cancer patients, leading to a rise in Japan’s medical costs.

On compiling the fiscal 2017 budget, Abe said the government aims to formulate a budget that will allocate money where appropriate, such as childcare, nursing care, and research and development that will support economic growth.