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Glimpses from Recent Arrivals

Scientific Information Division
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Please see inside back cover for abbreviations used for journals/magazines scanned regularly.

This bulletin has been compiled by the Scientific Information Division, PINSTECH from the recent popular journals/magazines. Please encircle reference number on the Order Form for the full text of article(s).

Your comments/suggestions are highly appreciated.

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AGRICULTURE/BIOTECHNOLOGY/GENETIC ENGINEERING

REALIZING THE PROMISE OF CANCER PREDISPOSITION GENES *(Nature-Jan. 16, 2014)* Genes in which germline mutations confer highly or moderately increased risks of cancer are called cancer predisposition genes. More than 100 of these genes have been identified, providing important scientific insights in many areas, particularly the mechanisms of cancer causation. Moreover, clinical utilization of cancer predisposition genes has had a substantial impact on diagnosis, optimized management and prevention of cancer. The recent transformative advances in DNA sequencing hold the promise of many more cancer predisposition gene discoveries, and greater and broader clinical applications. However, there is also considerable potential for incorrect inferences and inappropriate clinical applications. Realizing the promise of cancer predisposition genes for science and medicine will thus require careful navigation. *Nazneen Rahman, London, UK.* **(481)**

HOW ANTIBIOTICS BOOST INFECTION *(Nature-Jan. 23, 2014)* Antibiotics alter the bacterial community in the mouse gut in ways that might make the animal more susceptible to infections from the dangerous, diarrhoea-causing bacterium *Clostridium difficile*. Vincent Young and his team at the University of Michigan in Ann Arbor analysed the molecules produced by gut microbes and found that antibiotics shifted the levels of carbohydrates and other metabolites. **(482)**

SEX SPECIFICITY IN THE BLOOD *(Nature- Jan. 23, 2014)* Haematopoietic stem cells, from which blood cells originate, are shown to respond to oestrogen and divide more frequently in female mice than in males, probably preparing females for the increased demand for blood in pregnancy. *Dena S. Leeman & Anne Brunet, Stanford University.* **(483)**

ACID BATH OFFERS EASY PATH TO STEM CELLS *(Nature-Jan. 30, 2014)* Just squeezing or bathing cells in acidic conditions can readily reprogram them into an embryonic state. *David Cyranoski.* **(484)**

DNA MUGSHOT GIVES COPS ANOTHER LEAD *(NS-Mar. 22, 2014)* "In five to 10 years' time we will be able to predict a person's face from their DNA profile". *Peter Aldhous.* **(485)**

A SYNCHRONIZED GLOBAL SWEEP OF THE INTERNAL GENES OF MODERN AVIAN INFLUENZA VIRUS *(Nature-Apr. 10, 2014)* Zoonotic infectious diseases such as influenza continue to pose a grave threat to human health. However, the factors that mediate the emergence of RNA viruses such as influenza A virus (IAV) are still incompletely understood. Phylogenetic inference is crucial to reconstructing the origins and tracing the flow of IAV within and between hosts. *Michael Worobey et.all. USA.* **(486)**

NEW STEM CELLS A GENETIC MATCH FOR ADULTS *(Sci-Apr. 25, 2014)* Scientists are a step closer to developing replacement tissue that won't be rejected by a patient's immune system. Researchers have created human embryonic stem cells carrying the DNA of specific adults.

Theoretically, such stem cells can form any of the body's cell types and could be used in new treatments for Parkinson's disease, disease, diabetes and many other diseases. **(487)**

THE HUNT FOR MISSING GENES *(Sci-May. 16, 2014)* Identifying healthy human "knockouts" – people completely lacking a specific gene – may suggest new biomedical treatments. *Jocelyn Kaiser*. **(488)**

TARGETING THE HOST IMMUNE RESPONSE TO FIGHT INFECTION *(Sci-May. 23, 2014)* Strategies to modify immune responses to infection can be found in our genome. *J. Kenneth Baillie, UK.* **(489)**

A BACTERIAL SEEK – AND- DESTROY SYSTEM FOR FOREIGN DNA *(Sci-May. 30, 2014)* Bacterial argonaute proteins defend the cell against exogenous DNA. *Jorg Vogel.* **(490)**

THE FORGETTING GENE *(Nature-Jun. 5, 2014)* For decades, most researchers ignored the leading genetic risk factor for Alzheimer's disease. That is set to change. *Laura Spinney, Switzerland.* **(491)**

FUNDING WINDFALL RESCUES ABANDONED STEM – CELL TRIAL *(Nature-Jun. 5, 2014)* The trial aims to test whether cells derived from human embryonic stem cells can help nerves to regrow in cases of spinal-cord injury. It was stopped abruptly in 2011 by Geron of Menlo Park, California the firm said at the time that it wanted to focus on several promising cancer treatments instead. *Erika Check Hayden.* **(492)**

GEARING UP FOR A CLOSER LOOK AT THE HUMAN PLACENTA *(Sci-Jun. 6, 2014)* Workshop participants build an agenda for research on this – ignored bridge between mother and fetus. *Jocelyn Kaiser, Potomac, Maryland.* **(493)**

ARMAMENT/DISARMAMENT

EXPLOSIVE REVELATIONS *(NS-Jun. 7, 2014)* Cold war weapons tests had an unexpected upside. But time is running out to reap the benefits. *Gaia Vince, London.* **(494)**

ASTRONOMY/COSMOLOGY/SPACE SCIENCE

THE HEART OF DARKNESS *(Nature-Jan. 16, 2014)* The supermassive black holes that lie at the centre of every large galaxy are full of mysteries. But astronomers are finally getting a clear look. *Ron Cowen, Maryland.* **(495)**

KEPLER CLUE TO SUPERNOVA PUZZLE *(Nature-Jan. 16, 2014)* They are cosmic detonations that briefly outshine the light of entire galaxies. And they were a crucial tool in the

discovery of dark energy, the force that is accelerating the expansion of the Universe. Yet the process that gives rise to type Ia supernovae has remained mysterious. *Ron Cowen.* **(496)**

EARTH OBSERVATION ENTERS NEXT PHASE *(Nature-Apr. 10, 2014)* Europe has launched the first satellite of what is heralded as one of the most ambitious Earth-observation programmes ever. On 3 April, a Soyuz rocket dispatched into orbit the Sentinel-1A probe, the first craft of a planned constellation of six Sentinel families set to be launched by the end of the decade. Together, the satellites will offer unprecedented long-term monitoring of the planet's land, water and atmosphere. *Declan Butler.* **(497)**

PLUTO – BOUND PROBE FACES CRISIS *(Nature-May. 22, 2014)* NASA scientists scramble to find an object in the outer Solar System's Kuiper belt in time for a close – up visit. *Juan Maldacena, USA.* **(498)**

TESTING GAUGE / GRAVITY DUALITY ON A QUANTUM BLACK HOLE *(Sci-May. 23, 2014)* A numerical test shows that string theory can provide a self – consistent quantization of gravity. *Juan Maldacena, USA.* **(499)**

BLACKBUSTER CLAIM COULD COLLAPSE IN A CLOUD OF DUST *(Sci-May. 23, 2014)* Smoking – gun evidence for cosmic inflation may actually be radiation from within our galaxy. *Adrian Cho.* **(500)**

THE MAD WORLD OF BLACK HOLES *(Nature-Jun. 5, 2014)* An analysis of optical and radio observations has revealed how powerful jets are launched from the centres of active galaxies, where supermassive black holes accrete matter through magnetically arrested disks, or MADs. *Denise Gabuzda, Ireland.* **(501)**

BIG BANG BLUNDER BURSTS THE MULTIVERSE BUBBLE *(Nature-Jun. 5, 2014)* Premature hype over gravitational waves highlights gaping holes in models for the origins and evolution of the Universe, argues. *Paul Steinhardt, Princeton University.* **(502)**

SILENCE IS OLDEN *(NS-Jun. 14, 2014)* Forget the big bang, the birth of the universe was a very quiet affair. *Michael Brooks.* **(503)**

COMPUTER/INFORMATION TECHNOLOGY

UP TO SPEED WITH JAPAN'S K COMPUTER *(Nature-Jun. 9, 2014)* In 2011, the K computer shattered all previous records by delivering more than ten PFLOPS – equivalent to ten quadrillion calculations per second. Now opening its doors for shared use, the K computer continues to make an impact in such areas as climate research, disaster prevention and medicine. **(504)**

TO BEST RULE THE NET *(Sci-Apr. 25, 2014)* On the 25th anniversary of the World Wide Web,

Laura DeNardis' *The Global war for Internet Governance* brings us a sweep through the history of technical and political wrangling that led to the creation of the global Internet, Internet governance is an imprecise term, sometimes meant narrowly, to refer to the process by which Internet technical standards and the Domain Name System (.com, .edu, etc.) are managed, and sometimes taken very broadly to include the wide range of legal policy issues regarding the way people use the Internet, from security and copyright to privacy and government surveillance. DeNards (American University) employs the broader definition. *Daniel J. Weitzner, MIT, USA.* **(505)**

FORGOTTON PROPHET OF THE INTERNET *(Nature- May. 22, 2014)* Philip Ball ponders the tale of a librarian who dreamed of networking information. The Internet is considered a key achievement of the computer age. But as former New York Times staffer Alex Wright shows in the meticulously researched Cataloging the World, the concept predates digital technology. In the late nineteenth century, Belgian librarian Paul Otlet conceived schemes to collect, store, automatically retrieve and remotely distribute all human knowledge. His ideas have clear analogies with information archiving and networking on the web. Wright makes a persuasive case that Otlet --- now largely forgotton --- deserves to be ranked among the conceptual inventors of the Internet. *Philip Ball, London.* **(506)**

CLOUD COMPUTING BECONS SCIENTISTS *(Nature-May. 29, 2014)* Sometime in the next decade, the Square Kilometre Array (SKA) will open its compound eyes — roughly 2,000 radio dishes divided between sites in South Africa and Australia. The radio telescope will then begin staring into supermassive black holes, searching for the origin of cosmic magnetic fields and seeking clues about the young Universe. *Nadia Drake*. **(507)**

DIGITAL DOCTORS *(NS-Jun. 14, 2014)* A suite of medical apps called Medopad aims to make doctors more effective by putting everything on their iPad. *Charis Baraniuk*. **(508)**

HELP WANTED ON INTERNET SECURITY *(SA-July. 09, 2014)* For much of the past two years, two thirds of all Web sites were susceptible to having their memory extracted by remote attackers --- memory containing private information, passwords and encryption keys. The flaw, called Heartbleed, was the most serious Internet security flaw ever found. Heartbleed attacks would not have shown up in most sites' logs, so we cannot be sure how widely it was exploited or what might have been leaked. *Edward W. Felten and Joshua A. Kroll, Princeton.* **(509)**

ENERGY/NUCLEAR ENERGY

THE LAST WORD ON ENERGY *(NS-Mar. 22, 2014)* Nobody has all the answers to the world's energy questions, So New Scientist has teamed up with Statoil to create a special section of the Last Word to search for solutions. The best answers, published here. A lot of nuclear waste generates large amounts of energy. Why can't this stuff, which has to be kept underwater to stop it catching fire, be used to generate heat or electricity? *Cosy Nukes, USA.* **(510)**

CERAMICS COULD PREVENT NUCLEAR DISASTER *(PS-Mar. 26, 2014)* For more than

50 years, engineers have built the rods that hold nuclear fuel the same way, out of zirconium-based metal alloys. They maintain structural integrity at high temperatures and allow uranium neutrons to escape in order to produce nuclear reactions. But, as Fukushima demonstrated, they have a very serious drawback: At about 2,000°F, the stuff quickly reacts with steam, releasing heat and hydrogen gas that can easily ignite—and then explode. *Jesse Emspak.* **(511)**

TANKS FOR THE BATTERIES *(Sci-Apr. 25, 2014)* The need to store energy from wind, solar, and other renewable energy sources could spark a revival of a dormant battery technology. *Robert F. Service.* **(512)**

ENVIRONMENT/ECOLOGY

AIR OF DANGER *(Nature-May. 29, 2014)* Carcinogens are all around us, so scientists are broadening their ideas of environmental risk. *Rebecca Kessler, Island.* **(513)**

GLOBAL WARNING *(Nature-May. 29, 2014)* Much of the world is ill – equipped to cope with its rising cancer burden and are pushing prevention and screening. *Eric Bender, Massachusetts.* **(514)**

A SINK DOWN UNDER *(Nature-May. 29, 2014)* The finding that semi – arid ecosystems in the Southern Hemisphere may be largely responsible for changes in global concentrations of atmospheric carbon dioxide has repercussions for future levels of this greenhouse gas. *Daniel B. Metcalfe, Sweden.* **(515)**

CHANGING THE RESILIENCE PARADIGM *(NCC-Jun. 2014)* Resilience management goes beyond risk management to address the complexities of large integrated systems and the uncertainty of future threats, especially those associated with climate change. *Igor Linkov et.all. Sweden.* **(516)**

CAPTURING PROVENANCE OF GLOBAL CHANGE INFORMATION *(NCC-Jun. 2014)* Global change information demands access to data sources and well-documented provenance to provide the evidence needed to build confidence in scientific conclusions and decision making. A new generation of web technology, the Semantic Web, provides tools for that purpose. *Xiaogang Ma et.all.* **(517)**

SOLAR ULTRAVIOLET RADIATION IN A CHANGING CLIMATE *(NCC-Jun. 2014)* The projected large increases in damaging ultraviolet radiation as a result of global emissions of ozone-depleting substances have been forestalled by the success of the Montreal Protocol. New challenges are now arising in relation to climate change. We highlight the complex interactions between the drivers of climate change and those of stratospheric ozone depletion, and the positive and negative feedbacks among climate, ozone and ultraviolet radiation. *Craig E. Williamson, et.all. USA.* **(518)**

NITRATE ASSIMILATION IS INHIBITED BY ELEVATED CO_2 IN FIELD – GROWN WHEAT *(NCC-Jun. 2014)* Here, we present the first direct field test of this explanation. We analysed wheat (*Triticum aestivum* L.) grown under elevated and ambient CO_2 concentrations in the free-air CO_2 enrichment experiment at Maricopa, Arizona. In leaf tissue, the ratio of nitrate to total nitrogen concentration and the stable isotope ratios of organic nitrogen and free nitrate showed that nitrate assimilation was slower under elevated than ambient CO_2. These findings imply that food quality will suffer under the CO_2 levels anticipated during this century unless more sophisticated approaches to nitrogen fertilization are employed. *Arnold J. Bloom, et.all. California, USA.* **(519)**

MITIGATION OR MISSILES *(NCC-Jun. 2014)* The United States has the responsibly to not only protect its own citizens from the expected impacts of climate change, but also people living in distant lands. **(520)**

HEALTH/MEDICINE/SAFETY

DETECTIVE WORK ON DRUG DOSAGE *(Nature-Jan. 09, 2014)* Patients differ in their requirement for, and response to, various drug doses. A general platform that allows continuous monitoring of drug levels in the blood of rats may open the door to patient-specific dosing. *Richard M. Crooks, USA.* **(521)**

RINGSIDE VIEWS *(Nature-Jan. 09, 2014)* Two crystal structures reveal that the Vif and Vpx proteins of human and simian immunodeficiency viruses mediate evasion of host defences by reprogramming the cellular protein-degradation machinery. *Michael H. Malim, UK.* **(522)**

HMGA2 FUNCTIONS AS A COMPETING ENDOGENOUS RNA TO PROMOTE LUNG CANCER PROGRESSION *(Nature-Jan. 09, 2014)* Non-small-cell lung cancer (NSCLC) is the most prevalent histological cancer subtype worldwide. As the majority of patients present with invasive, metastatic disease, it is vital to understand the basis for lung cancer progression. *Hmga2* is highly expressed in metastatic lung adenocarcinoma, in which it contributes to cancer progression and metastasis. *Madhu S. Kumar et.all. UK.* **(523)**

PERTURBED NEURAL ACTIVITY DISRUPTS CEREBRAL ANGIOGENESIS DURING A POSTNATAL CRITICAL PERIOD *(Nature-Jan. 16, 2014)* During the neonatal period, activity-dependent neural-circuit remodelling coincides with growth and refinement of the cerebral microvasculature. Whether neural activity also influences the patterning of the vascular bed is not known. *Christina Whiteus et.all. USA.* **(524)**

INTERNEURON CELL TYPES ARE FIT TO FUNCTION *(Nature-Jan. 16, 2014)* Understanding brain circuits begins with an appreciation of their component parts — the cells. Although GABAergic interneurons are a minority population within the brain, they are crucial for the control of inhibition. Determining the diversity of these interneurons has been a central goal of neurobiologists, but this amazing cell type has so far defied a generalized classification system.

Interneuron complexity within the telencephalon could be simplified by viewing them as elaborations of a much more finite group of developmentally specified cardinal classes that become further specialized as they mature. Our perspective emphasizes that the ultimate goal is to dispense with classification criteria and directly define interneuron types by function. *Adam Kepecs & Gordon Fishell, USA.* **(525)**

NOT – SO – INNOCENT BYSTANDERS *(Nature-Jan. 23, 2014)* The discovery that most $CD4^+$ T cells killed during HIV infection die through a process known as pyroptosis may provide long-sought explanations for HIV-associated T-cell depletion and inflammation. *Andreal L. Cox & Robert F. Siliciano, USA.* **(526)**

RARE CODING VARIANTS IN THE PHOSPHOLIPASE D3 GENE CONFER RISK FOR ALZHEIMER'S DISEASE *(Nature-Jan. 23, 2014)* Genome-wide association studies (GWAS) have identified several risk variants for late-onset Alzheimer's disease (LOAD). These common variants have replicable but small effects on LOAD risk and generally do not have obvious functional effects. Low-frequency coding variants, not detected by GWAS, are predicted to include functional variants with larger effects on risk. To identify low-frequency coding variants with large effects on LOAD risk, we carried out whole-exome sequencing (WES) in 14 large LOAD families and follow-up analyses of the candidate variants in several large LOAD case–control data sets. *Carlos Cruchaga et.all. USA.* **(527)**

OESTROGEN INCREASES HAEMATOPOIETIC STEM – CELL SELF – RENEWAL IN FEMALES AND DURING PREGNANCY *(Nature-Jan. 23, 2014)* Sexually dimorphic mammalian tissues, including sexual organs and the brain, contain stem cells that are directly or indirectly regulated by sex hormones. An important question is whether stem cells also exhibit sex differences in physiological function and hormonal regulation in tissues that do not show sex-specific morphological differences. The terminal differentiation and function of some haematopoietic stem-cell function is thought to be similar in both sexes. *Daisuke Nakada et.all. USA.* **(528)**

IMMUNOLOGICAL AND VIROLOGICAL MECHANISMS OF VACCINE – MEDIATED PROTECTION AGAINST SIV AND HIV *(Nature-Jan. 23, 2014)* A major challenge for the development of a highly effective AIDS vaccine is the identification of mechanisms of protective immunity. To address this question, we used a nonhuman primate challenge model with simian immunodeficiency virus (SIV). We show that antibodies to the SIV envelope are necessary and sufficient to prevent infection. *Mario Roederer et.all. USA.* **(529)**

JOINED – UP THINKING *(Nature-Jan. 30, 2014)* Chris Frith explores a masterful model of how consciousness plays out in the theatre of the brain. *Chris Frith. Denmark.* **(530)**

PAN – VIRAL SPECIFICITY OF IFN – INDUCED GENES REVEALS NEW ROLES FOR CGAS IN INNATE IMMUNITY *(Nature-Jan. 30, 2014)* The type I interferon (IFN) response protects cells from viral infection by inducing hundreds of interferon-stimulated genes (ISGs),

some of which encode direct antiviral effectors. Recent screening studies have begun to catalogue ISGs with antiviral activity against several RNA and DNA viruses. However, antiviral ISG specificity across multiple distinct classes of viruses remains largely unexplored. *John W. Schoggins et.all. USA.* **(531)**

LET THEM EAT SALT: DRUG CUTS SODIUM *(NS-Mar. 22, 2014)* You may one day be able to take a drug that decreases the amount of salt your body absorbs from food. Such a reduction could help people with kidney disease who aren't meant to eat more than 5 grams a day, says Dominique Charmot of the drugs developers Ardelyx, based in California**. (532)**

IMMUNE RESET AIDS KIDNEY TRANSPLANTS *(NS-Apr. 5, 2014)* There's a better way to deal with rejection. People who have received a donor organ need to take a host of toxic drugs to stop their immune system attacking it. Soon they might just have their immune system rebooted – making it accept the new organ. The technique has been tried for the first time on 20 kidney transplant recipients. Normally they would have to take up to 20 drugs daily, with a risk of developing kidney failure or cancer, as well as side effects such as bloating and diarrhoea. *Andy Coghlan.* **(533)**

OBESITY LINKED TO CARB DIGESTION *(NS-Apr. 5, 2014)* "I'm off the carbs" is a familiar refrain among dieters. But could this approach to losing weight be better for some than others That's the implication of research suggesting that obesity may be linked to how our bodies digest the starch found in carbohydrate – rich foods**. (534)**

METABOLIC QUIRKS YIELD TUMOUR HOPE *(Nature-Apr. 10, 2014)* Cancer cells harness unusual metabolic pathways to obtain the energy and molecular building blocks that they need for their relentless proliferation. Many potential drugs have tried to take advantage of this hunger. Early results for a genetically targeted drug, unveiled this week at the annual meeting of the American Association for Cancer Research in San Diego, California, suggest that the approach could pay off. *Heidi Ledford.* **(535)**

NICOTINAMIDE N – METHYLTRANSFERASE KNOCKDOWN PROTECTS AGAINST DIET – INDUCED OBESITY *(Nature-Apr. 10, 2014)* In obesity and type 2 diabetes, *Glut4* glucose transporter expression is decreased selectively in adipocytes. Adipose-specific knockout or overexpression of *Glut4* alters systemic insulin sensitivity. Here we show, using DNA array analyses, that nicotinamide *N*-methyltransferase (*Nnmt*) is the most strongly reciprocally regulated gene when comparing gene expression in white adipose tissue (WAT) from adipose-specific *Glut4*-knockout or adipose-specific *Glut4*-overexpressing mice with their respective controls. NNMT methylates nicotinamide (vitamin B3) using *S*-adenosylmethionine (SAM) as a methyl donor. Nicotinamide is a precursor of NAD^+, an important cofactor linking cellular redox states with energy metabolism. *Daniel Kraus et.all. USA.* **(536)**

CALL FOR BETTER OVERSIGHT OF NUCLEAR – WASTE STORAGE *(Nature-May. 15, 2014)* A serious accident at the United States' only deep-storage repository for nuclear waste might never have happened had the government not disbanded a key independent scientific body charged with oversight of the safety of the facility. *Declan Butler.* **(537)**

NUCLEOTIDE SIGNALLING DURING INFLAMMATION *(Nature-May. 15, 2014)* Inflammatory conditions are associated with the extracellular release of nucleotides, particularly ATP. In the extracellular compartment, ATP predominantly functions as a signalling molecule through the activation of purinergic P2 receptors. Metabotropic P2Y receptors are G-protein-coupled, whereas ionotropic P2X receptors are ATP-gated ion channels. Here we discuss how signalling events through P2 receptors alter the outcomes of inflammatory or infectious diseases. *Marco Idzko et.all. Germany.* **(538)**

STRUCTURE OF THE CORE ECTODOMAIN OF THE HEPATITIS C VIRUS ENVELOPE GLYCOPROTEIN 2 *(Nature-May. 15, 2014)* Hepatitis C virus (HCV) is a significant public health concern with approximately 160 million people infected worldwide. HCV infection often results in chronic hepatitis, liver cirrhosis and hepatocellular carcinoma. No vaccine is available and current therapies are effective against some, but not all, genotypes. HCV is an enveloped virus with two surface glycoproteins (E1 and E2). E2 binds to the host cell through interactions with scavenger receptor class B type I (SR-BI) and CD81, and serves as a target for neutralizing antibodies. Little is known about the molecular mechanism that mediates cell entry and membrane fusion, although E2 is predicted to be a class II viral fusion protein. *Abdul Ghfoor et.all. USA.* **(539)**

AN ACCIDENT WAITING TO HAPPEN *(Nature-May. 15, 2014)* The release of radioactive material at a US nuclear – waste repository reveals an all – too – common picture of complacency over safety and a gradual downgrading of regulations. "It took an accident to uncover glaring safety weaknesses and the lack of a strong safety culture." **(540)**

CRIPPLING VIRUS SET TO CONQUER WESTERN HEMISPHERE *(Sci-May. 16, 2014)* The world of infectious diseases is full of unpleasant surprises. But the explosive outbreak of a virus called chikungunya now happening on a string of Caribbean islands isn't one of them. Scientists have said for years that the virus was bound to come to the Western Hemisphere. And now that it has, they have another prediction: Mosquitoes will almost certainly spread it far and wide, from the southern United States to Argentina. Big, dense cities will be especially vulnerable to the virus, which can cause rashes, fever, and agonizing, sometimes lasting, pain in fingers, wrists, elbows, toes, ankles, and knees. Millions will likely get sick. *Martin Enserink.* **(541)**

DRAWINIAN TUMOUR SUPPRESSION *(Nature-May. 22, 2014)* Competition for access to a survival factor has been found to explain why incoming cells from the bone marrow replace resident cells in the thymus. Reducing this competition can cause tumours to form. *Eduardo Moreno.* **(542)**

MFSD2A IS CRITICAL FOR THE FORMATION AND FUNCTION OF THE BLOOD – BRAIN BARRIER *(Nature-May. 22, 2014)* The central nervous system (CNS) requires a tightly controlled environment free of toxins and pathogens to provide the proper chemical composition for neural function. This environment is maintained by the 'blood–brain barrier' (BBB), which is composed of blood vessels whose endothelial cells display specialized tight junctions and extremely low rates of transcellular vesicular transport (transcytosis). In concert with pericytes and astrocytes, this unique brain endothelial physiological barrier seals the CNS and controls substance influx and efflux. Although BBB breakdown has recently been associated with initiation and perpetuation of various neurological disorders, an intact BBB is a major obstacle for drug delivery to the CNS. *Ayal Ben – Zvi et.all. USA.* **(543)**

THE INTERGENERATIONAL TRANSMISSION OF INEQUALITY: MATERNAL DISADVANTAGE AND HEALTH AT BIRTH *(Sci-May. 23, 2014)* Health at birth is an important predictor of long-term outcomes, including education, income, and disability. Recent evidence suggests that maternal disadvantage leads to worse health at birth through poor health behaviors; exposure to harmful environmental factors; worse access to medical care, including family planning; and worse underlying maternal health. With increasing inequality, those at the bottom of the distribution now face relatively worse economic conditions, but newborn health among the most disadvantaged has actually improved. The most likely explanation is increasing knowledge about determinants of infant health and how to protect it along with public policies that put this knowledge into practice. *Anna Aizer and Janet Currie, USA.* **(544)**

ANTIBODIES TO PFSEA – 1 BLOCK PARASITE EGRESS FROM RBCS AND PROTECT AGAINST MALARIA INFECTION *(Sci-May. 23, 2014)* Novel vaccines are urgently needed to reduce the burden of severe malaria. Using a differential whole-proteome screening method, we identified *Plasmodium falciparum* schizont egress antigen-1 (PfSEA-1), a 244-kilodalton parasite antigen expressed in schizont-infected red blood cells (RBCs). *Dipak K. Raj et.all. USA.* **(545)**

DELIVER ON A PROMISE *(Nature-May. 29, 2014)* Effective treatment of cancer requires getting the drugs precisely to the target. Enter the nanoparticle. *Jessica Wright, New York.* **(546)**

NAKED AMBITION *(Nature-May. 29, 2014)* A subterranean species that seems to be cancer – proof is providing promising clues on how we might prevent the disease in humans. *Sara Deweerdt, Washington.* **(547)**

CURE – ALL NO MORE *(NS-May. 31, 2014)* The world's favourite over – the – counter pain remedy, paracetamol, has a dark side. *Tiffany O' Callaghan.* **(548)**

INCREASING CO_2 THREATENS HUMAN NUTRITION *(Nature-Jun. 5, 2014)* Dietary deficiencies of zinc and iron are a substantial global public health problem. An estimated two billion people suffer these deficiencies, causing a loss of 63 million life-years annually. Most of

these people depend on C_3 grains and legumes as their primary dietary source of zinc and iron. *Samuel S. Myers et.all. USA.* **(549)**

NOCICEPTIVE SENSORY NEURONS DRIVE INTERLEUKIN – 23 – MEDIATED PSORIASIFORM SKIN INFLAMMATION *(Nature -Jun. 5, 2014)* The skin has a dual function as a barrier and a sensory interface between the body and the environment. To protect against invading pathogens, the skin harbours specialized immune cells, including dermal dendritic cells (DDCs) and interleukin (IL)-17-producing γδ T (γδT17) cells, the aberrant activation of which by IL-23 can provoke psoriasis-like inflammation. The skin is also innervated by a meshwork of peripheral nerves consisting of relatively sparse autonomic and abundant sensory fibres. Interactions between the autonomic nervous system and immune cells in lymphoid organs are known to contribute to systemic immunity, but how peripheral nerves regulate cutaneous immune responses remains unclear. We exposed the skin of mice to imiquimod, which induces IL-23-dependent psoriasis-like inflammation. *Lorena Riol - Blanco et.all. USA.* **(550)**

THE ROLE OF HEPATIC LIPIDS IN HEPATIC INSULIN RESISTANCE AND TYPE 2 DIABETES *(Nature-Jun. 5, 2014)* Non-alcoholic fatty liver disease and its downstream sequelae, hepatic insulin resistance and type 2 diabetes, are rapidly growing epidemics, which lead to increased morbidity and mortality rates, and soaring health-care costs. Developing interventions requires a comprehensive understanding of the mechanisms by which excess hepatic lipid develops and causes hepatic insulin resistance and type 2 diabetes. *Rachel J. Perry et.all. USA.* **(551)**

SPHINGOLIPID METABOLITES IN INFLAMMATORY DISEASE *(Nature-Jun. 5, 2014)* Sphingolipids are ubiquitous building blocks of eukaryotic cell membranes. Progress in our understanding of sphingolipid metabolism, state-of-the-art sphingolipidomic approaches and animal models have generated a large body of evidence demonstrating that sphingolipid metabolites, particularly ceramide and sphingosine-1-phosphate, are signalling molecules that regulate a diverse range of cellular processes that are important in immunity, inflammation and inflammatory disorders. Recent insights into the molecular mechanisms of action of sphingolipid metabolites and new perspectives on their roles in regulating chronic inflammation have been reported. The knowledge gained in this emerging field will aid in the development of new therapeutic options for inflammatory disorders. *Michael Maceyka & Sarah Spiegel, USA.* **(552)**

QUALITY – CONTROL PATHWAY UNLOCKED *(Nature-Jun. 5, 2014)* A modified ubiquitin protein has been identified by three independent studies as the missing link in a cellular quality – control pathway that is implicated in parkinson's disease. *Asa Abeliovich, New York.* **(553)**

THE MEMORY FIX *(NS-Jun. 7, 2014)* Implants that bridge damaged parts of the brain are no longer a distant dream. "Place an implant in the brain's 'printing press' and we may be able to record memories as they form." *Sally Adee.* **(554)**

THE UNFOLDED PROTEIN RESPONSE GOVERNS INTEGRITY OF THE HAEMATOPOIETIC STEM – CELL POOL DURING STRESS *(Nature-Jun. 12, 2014)* The

blood system is sustained by a pool of haematopoietic stem cells (HSCs) that are long-lived due to their capacity for self-renewal. A consequence of longevity is exposure to stress stimuli including reactive oxygen species (ROS), nutrient fluctuation and DNA damage. Damage that occurs within stressed HSCs must be tightly controlled to prevent either loss of function or the clonal persistence of oncogenic mutations that increase the risk of leukaemogenesis. Despite the importance of maintaining cell integrity throughout life, how the HSC pool achieves this and how individual HSCs respond to stress remain poorly understood. *Peter Van Galen et.all. Canada.* **(555)**

THERAPEUTIC TARGETING OF BET BROMODOMAIN PROTEINS IN CASTRATION - RESISTANT PROSTATE CANCER *(Nature-Jun. 12, 2014)* Men who develop metastatic castration-resistant prostate cancer (CRPC) invariably succumb to the disease. Progression to CRPC after androgen ablation therapy is predominantly driven by deregulated androgen receptor (AR) signalling. Despite the success of recently approved therapies targeting AR signalling, such as abiraterone and second-generation anti-androgens including MDV3100 (also known as enzalutamide), durable responses are limited, presumably owing to acquired resistance. *Irfan A. Asangani et.all. USA.* **(556)**

EVERY LAST TRACE *(NS-Jun. 14, 2014)* How do you wipe a disease off the face of a planet. It is biologicaly feasible to eradicate measles. But it is difficult to run several eradication programmes in parallel. *Irfan Meera Senthilingam, London.* **(557)**

PTEN ACTION IN LEUKAEMIA DICTATED BY THE TISSUE MICROENVIRONMENT *(Nature-Jun. 19, 2014) PTEN* encodes a lipid phosphatase that is underexpressed in many cancers owing to deletions, mutations or gene silencing. PTEN dephosphorylates phosphatidylinositol triphosphate, thereby opposing the activity of class I phosphatidylinositol 3-kinases that mediate growth- and survival-factor signalling through phosphatidylinositol 3-kinase effectors such as AKT and mTOR. To determine whether continued PTEN inactivation is required to maintain malignancy, here we generate an RNA interference-based transgenic mouse model that allows tetracycline-dependent regulation of PTEN in a time- and tissue-specific manner. *Cornelius Miething et.all. USA.* **(558)**

HIV TRIA ATTACKED *(Nature-Jun. 19, 2014)* Treatment of people with HIV has advanced so much that some doctors and activists are urging the US National Institute of Allergy and Infectious Diseases (NIAID) to stop a trial that compares how well older and newer protocols keep mothers from passing HIV on to their newborn babies. *Erika Check Hayden.* **(559)**

BIONIC PANCREAS CUTS DIABETES STRESS *(NS-Jun. 21, 2014)* ED Damino's son was 11 months old when he was diagnosed with type 1 diabetes. By the time he heads off to college in 2017, his father hopes to have freed him – and millions of others – from the burden of managing the disease. Damiano, a biomedical engineer, has created a digital pancreas that automatically regulates sugar levels in the blood via a smartphone. The latest clinical trials of the device suggest he might just hit his deadline. *Bob Roehr.* **(560)**

HYDROLOGY/GEOSCIENCE

MANY EYES ON EARTH *(Nature-Jan. 09, 2014)* Swarms of small satellites set to deliver close to real-time imagery of swathes of the planet. Imagine using Google Earth or other online mapping tools to zoom in on high-resolution satellite images of the planet taken just hours or days ago. Navigating backwards and forwards in time, one could track changes in everything from crops, forests and wildlife movement to urban sprawl and natural disasters, all with unrivalled temporal precision. *Declan Butler* **(561)**

THE INNER EARTH *(PS. Apr. 08.2014)* Plate tectonics—the theory that explains the sinking, spreading, and slip-sliding of big chunks of Earth's surface—is a bedrock of geology. But it can't explain what happens to plates once they sink, or account for the forces that drive many of the planet's volcanic hotspots. Today, advances in seismology, geochemical analysis, and computer modeling have enabled researchers to collect a wealth of new geological data about our planet and form a complementary theory of what's going on beneath its surface. *Valerie Ross* **(562)**

ORIGINGS OF PLATE TECTONICS *(Nature-Apr. 10, 2014)* Plate tectonics—the division of Earth's surface into rigid plates separated by linear zones of concentrated deformation—is unique among known terrestrial bodies and it is still not clear how it arose. Here David Bercovici and Yanick Ricard outline an explanation that starts with the microscopic properties of deforming minerals. When sufficient lithospheric damage accumulates, the theory states, shear-localization occurs and long-lived weak zones develop. Transient mantle flow and migrating proto-subduction then create plate boundaries and later, tectonic plates. *Bercovici and Yanick Ricard* **(563)**

MANAGEMENT/INFORMATION

JANET ROWLEY *(Nature-Jan. 23, 2014)* Geneticist who discovered that broken chromosomes cause cancer. *Brian J. Druker, Japan.* **(564)**

AN INTERGOVERNMENTAL PANEL ON ANTIMICROBIAL RESISTANCE *(Nature-May. 29, 2014)* Drug-resistant microbes are spreading. A coordinated, global effort is needed to keep drugs working and develop alternatives. *Mark Woolhouse and Jeremy Farrar.* **(565)**

MATERIALS

IMAGING CRYSTALLIZATION *(Sci-May. 16, 2014)* Real – time atomic force microscopy provides insights into complex processes associated with crystal growth. *Preshit Dandekar and Michael F. Doherty, USA.* **(566)**

NANOTWINNED DIAMOND WITH UNPRECEDENTED HARDNESS AND STABILITY *(Nature-Jun. 12, 2014)* Although diamond is the hardest material for cutting tools, poor thermal stability has limited its applications, especially at high temperatures. Simultaneous improvement of

the hardness and thermal stability of diamond has long been desirable. According to the Hall−Petch effect, the hardness of diamond can be enhanced by nanostructuring (by means of nanograined and nanotwinned microstructures), as shown in previous studies. *Quan Huang et.all*. **(567)**

SCIENCE

AN ATOMIC SQUID *(Nature-Jan. 9, 2014)* Superconducting quantum circuits are the core technology behind the most sensitive magnetometers. An analogous device has now been implemented using a gas of ultracold atoms, with possible applications for rotation sensing. *Charles A. Sackett, USA.* **(568)**

A METAL – FREE ORGANIC – INORGANIC AQUEOUS FLOW BATTERY *(Nature-Jan. 9, 2014)* As the fraction of electricity generation from intermittent renewable sources—such as solar or wind—grows, the ability to store large amounts of electrical energy is of increasing importance. Solid-electrode batteries maintain discharge at peak power for far too short a time to fully regulate wind or solar power output. In contrast, flow batteries can independently scale the power (electrode area) and energy (arbitrarily large storage volume) components of the system by maintaining all of the electro-active species in fluid form. Wide-scale utilization of flow batteries is, however, limited by the abundance and cost of these materials, particularly those using redox-active metals and precious-metal electrocatalysts. *Brian Huskinson et.all. USA.* **(569)**

EINSTEIN'S CURVE BALL *(Nature-Jan. 30, 2014)* The mathematical physicist Max Born remarked in 1955 that although his late friend Albert Einstein's general theory of relativity was a peerless scientific achievement. "Its connections with experience [are] slender". The appeal of the theory for Born was similar to that of " a great work of art, to be enjoyed and admired at a distance". *Graham Farmelo, Cambridge.* **(570)**

RIPPLES OF THE MULTIVERSE *(NS-Mar. 22, 2014)* Wave hello to the multiverse? Ripples in the very fabric of the cosmos, unveiled this week, are allowing us to peer further back in time than anyone thought possible, showing us what was happening in the first slivers of a second after the big bang. The discovery of these primordial waves could solidify the idea that our young universe went through a rapid growth spurt called inflation. And that theory is linked to the idea that the universe is constantly giving birth to smaller "pocket" universes within an everexpanding multiverse. **(571)**

RIPPLE OF EXCITEMENT *(NS-Mar. 22, 2014)* Will a glimpse of primodial gravitational waves inspire physics? "Modelling inflation is like playing whack – a – mole. This will knock some theories out, but more will pop up". **(572)**

A STRONG HYBIRD COUPLE *(Nature-Apr. 10, 2014)* A single atom in an optical cavity is shown to interact strongly with an incoming photon and to switch the photon's state. This finding opens up a path towards optical quantum computation and quantum networks. *Luming Duan.* **(573)**

ELECTRONIC CONTROL OF CIRCULARLY POLARIZED LIGHT EMISSION *(Sci-May. 16, 2014)* The handedness of circularly polarized light, which is normally controlled by rotating filters, was switched by the electric field direction in a light – emitting device. *Jana Zaumesil, Germany.* **(574)**

HITTING THE LIMIT OF MAGNETIC ANISOTROPY *(Sci-May. 30, 2014)* Enhancing the magnetic properties of adatoms provides a route toward atom – scale memory. *Alexander Ako Khajetoorians and Jens Wiebe.* **(575)**

EXOTIC FOUR – QUARK PARTICLE CONFIRMED *(Nature-Jun. 19, 2014)* A team have confirmed the existence of a four-quark particle, named Z(4430). The finding, together with other exotic particles, challenges the idea that quarks only combine in pairs (mesons) or triplets. Z(4430) was first spotted in 2008 at the Belle detector in Japan, but another detector in California failed to see it, casting doubt on the initial observations. A team working on the LHCb experiment at CERN, Europe's particle physics laboratory near Geneva in Switzerland, analysed about a billion high – energy proton – proton collisions. The scientists noticed that in about 4,000 cases there was a highly significant Z(4430) signal – about 14 standard deviations above background levels. **(576)**

ADD NEURONS SUBTRACT ANXIETY *(SA-Jul. 2014)* The adult brain generates neurons every day. These cells help us to distinguish one memory from another – a finding that could lead to novel treatments for anxiety disorders. *Mazen A. Kheirbek and Rene Hen*. **(577)**

BODY WORKS *(SA-Jul. 2014)* Nobel Prize winners have publishe 245 articles in the pages of Scientific American. Here we present expets from stories in our archives that highlighted new insights into how the body functions. These selections are our tribute to the scientists who are convening in Germany this summer for the 64th Lindau Nobel Laureate Meeting, at which some 600 up – and – coming young researchers will exchange findings and ideas with 38 prizewinners in Physiology or medicine. *Ferris Jabr and Sam Falconer.* **(578)**

TECHNOLOGY/ NANOTECHNOLOGY/ELECTRONICS

EXTRA – STRETCHY GRAPHENE GLOVES *(Nature-Jan. 9, 2014)* Graphene-based sensors that measure strain, or deformation, can be stretched to twice their normal length. These could be useful for the development of wearable interactive electronics. **(579)**

STRUCTURAL BASIS FOR HIJACKING CBF – β AND CUL5 E3 LIGASE COMPLEX BY HIV – I VIF *(Nature-Jan. 9, 2014)* The human immunodeficiency virus (HIV)-1 protein Vif has a central role in the neutralization of host innate defences by hijacking cellular proteasomal degradation pathways to subvert the antiviral activity of host restriction factors however, the underlying mechanism by which Vif achieves this remains unclear. Here we report a crystal structure of the Vif–CBF-β–CUL5–ELOB–ELOC complex. The structure reveals that Vif, by

means of two domains, organizes formation of the pentameric complex by interacting with CBF-β, CUL5 and ELOC. *Yingying Guo et.all. China.* **(580)**

PHYSIOLOGICAL DATA MUST REMAIN CONFIDENTIAL *(Nature-Jan. 16, 2014)* Electronic devices that track our emotions, heart rate or brain waves should be regulated to protect individual privacy, says *Stephen Fairclough*, *UK.* **(581)**

LIFE IN THE DANGER ZONE *(Nature-Jan. 16, 2014)* Instruments for studying microbes under biological containment cannot be readily removed from labs for servicing. A US facility is finding ways around that problem. *Vivien Marx.* **(582)**

PROTECTING THE WEAK FROM THE STRONG *(Nature-Jan. 23, 2014)* A thin engineered surface has been developed that can protect sensitive electronic systems from strong signal interference, allowing them to communicate effectively with external antennas. *George V. Eleftheriades, Canada.* **(583)**

SURGERY BOT FITS IN ASTRONAUT'S GUT *(NS-Apr. 5, 2014)* The fist-sized robot, a product of Virtual Incision in Lincoln, Nebraska, will have its first zero-gravity test – in an aircraft flying in parabolic arcs – in the next few months. While aloft, the surgery bot will perform a set of exercises to demonstrate its dexterity, such as manipulating rubber bands and other inanimate objects. The hope is that such robots will accompany future astronauts on long deep-space missions, when the chances are higher that someone will experience physical trauma. "It must be an emergency if you would consider surgery in space," says team member Shane Farritor at the University of Nebraska-Lincoln. *Aviva Rutkin.* **(584)**

ELECTRICALLY DRIVEN NUCLEAR SPIN RESONANCE IN SINGLE – MOLECULE MAGNETS *(Sci-Jun. 6, 2014*) Recent advances in addressing isolated nuclear spins have opened up a path toward using nuclear-spin–based quantum bits. Local magnetic fields are normally used to coherently manipulate the state of the nuclear spin; however, electrical manipulation would allow for fast switching and spatially confined spin control. *Stefan Thiele et.all. France*. **(585)**

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Glimpses from Recent Arrivals

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