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Earth in transition from the Holocene:
Jan Zalasiewicz writes

Grazed by history:
Charles Darwin in a world of abolitionists
by Helen Gavaghan

WHO reviews 10-years of global health

Quiz 2

A scientifically literate humanities quarterly for scientists and politicians internationally

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Correction. WB Yeats on page 20 should, of course, be WH Auden. First published 26th May, 2017.

Cover: Credit NASA.
Taken from Apollo 13 during the trans Earth-Moon voyage.
The image is located on the NASA website in their image gallery.

Science, People & Politics is a scientifically literate humanities' quarterly.
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HISTORY OF SCIENCE OR SCIENCE IN HISTORY

It can help to know why something which, at face value, looks as though it should have been done, was not done. That way the wheel is not re-invented, nor the impossible attempted, nor a war started, nor the possible tried when it is impractical, or unsustainable without some other factor being addressed. The point is relevant to news analysis in this issue of US medical-device regulation strategy (p23) and our main features.

In a world of big data, in which we are told data are more valuable than oil or gas, it helps to know also whether literature meta analyses compare like with like, or if subtle distortions exist because data were collected in response to directed rather than investigator-driven research, or whether relevant findings published in another context are missing, thus, potentially, introducing a spike to the literature, which might have meaning other than seems obvious. Proper historicizing of the time in which data are collected could lead to a different meaning than statistical analysis alone, no matter how sophisticated the statistical models and framework.

Digging more deeply into the epistemological quality of a paper's assertions, and the bibliography supporting each statement of fact, can reveal whether it was the science knowledge or technology of the time which led to apparently obvious experiments not being conducted. Surmising the existence of dark matter, without further understanding dark matter's nature, might be as far as the science of a particular time can go.

To my mind, properly contextualising meta analyses is one way in which history and science can usefully leverage the quality of one another's knowledge bases. Of course, neither subject needs a justification of utility, but since much of this quarter's issue is about the role science and history play in knowledge building and knowledge experience, the point that there is utility quantifiable in cash terms seems worth making.

HISTORY OF SCIENCE, AND ITS RELATIONSHIP TO META ANALYSES IN GEOLOGY

The history of science and science in history are both critical to one of the biggest debates of our day, namely whether humanity is now shaping geological strata. See Jan Zalasiewicz's article this issue, pp 9-16, and note the feature by Fred Pearce in Issue 4 (2016) of this title [1]. We live in an age when geologists are taking to the field to see whether meta analyses indicate we are leaving the Holocene and heading for the Anthropocene. [See: Gavaghan. H. "*Geologists plan international research to settle the question of anthropocene v. Anthropocene*", p4, Iss 4 (Oct.–Dec.), 2016, V VII.

By contrast, "Grazed by History" (pp 17-22), sets Charles Darwin against the historical backdrop of global anti-slave trade activity.

At the time, the Royal Navy's survey ship HMS Beagle, with Charles Darwin aboard, was on a five-year voyage of discovery (1831-1836). The Beagle had only recently returned from a four-year survey (1826-1830) of the coast of Patagonia and Tierra del Fuego. Locations which at that time were home to indigenous peoples, and susceptible to piracy.

What, then, are the different ways in which science and its history, and/or the place of science in history, are framed?

It might be that the history of importance to science is an impeccable journey through the knowledge reporting publications and the sources drawn on to reach the stage of submission of a piece of research for peer review and publication.

If researchers found a particular protein interrupted a specific biological pathway, what came next in the history being told? An historian would look for evidence within the nature of the history being developed; asking, is non-science history driving, shaping or emerging from the science of the day, thus opening new horizons of and contexts and analyses for science knowledge? Or is the pertinent historical narrative an account having as its purpose knowing the epistemological quality of the science knowledge for the sake of science alone?

It is hard to imagine such an hermetically-sealed piece of science history. At the very least one would expect to come up against questions unanswerable because the correct instrumentation was too expensive, or had not yet been developed to work at the scale needed, be it of electro-magnetic frequency, or of space, or of time, Or there might have been some other barrier to science history for the sake of science alone.

But if the driver is science for the sake of science alone, did the researchers reporting that the protein disrupted a single species' biological pathway know how widespread among species such disruption is?

Did they live in an age in which chemical commonality of proteins among species was known? If unknown, and protein commonality among species was discovered, that discovery would likely have been serendipitous, rather than a null hypothesis which had withstood the onslaught of modern scientific research. Even if knowledge of protein chemical commonality among species was unknown in the past under historical investigation, then re-analysis of past work in the light of current knowledge might have validity in the present.

For the sake of argument, let's say researchers knew of protein chemical commonality among species, and that those proteins, chemically analogous (not replicas), of one another impacted the same biological pathway for a function shared with other species of a phylogenetic grouping.

Consider, for example, cleavage of DNA. That action differs subtly in varied biological settings. Small changes in temperature or pressure impact reaction kinetics, protein conformation etc... Researchers who developing CRISPR patent applications in prokaryotes and eukaryotes know this well. See, Gavaghan H. "*US Patent and Trial appeal board transcends biology*", pp 5-7, Iss One (Jan.- Mar.), V VIII, 2017.

Now it is the turn of geologists to evaluate evidence in the history of their field. Giving credence to non-expert opinion is good, but pandering to populist desire to shape the anthropocene v Anthropocene debate would do humanity a disservice. Jan Zalasiewicz's article shows that lay voices are being heeded, but experts are not abdicating responsibility. || Helen Gavaghan

[1] Pearce F (2016). What's in a name. *Science, People & Politics*, pp15-21, Iss 4 (Oct.-Dec), VVII. http://www.gavaghancommunications.com/sppiss416p15.html

World Health Organisation (WHO) reviews decade of global health development and looks to future challenges [1]

By Helen Gavaghan*

Rotavirus is the leading cause of diarrhoeal-induced death in under five-years olds, according to "Healthier, fairer, safer: the Global Health journey 2007-2017", published this May by the WHO. Pneumococcus, which like rotavirus is preventable by vaccination, also poses threats to this age group. Despite these preventable deaths, the world has made progress in meeting the Millennium Development Goal of reducing the number of deaths of under five-year olds.

Those verified reductions in death among under fives, and improvement in maternal mortality statistics, have not ended discrepancies between developed and under-developed countries. Life -time risk of maternal death is 1 in 35 in sub Saharan Africa, says the report, massively higher than the 1 in 4900 prevalent in the developed world.

As for death among under-fives, while falling overall, neonatal death is reducing less rapidly than it is for slighter older babies and toddlers. In 2015, 2.6 million babies died during the first month of their life. Since the World Health Assembly Meeting of 2014, all countries are asked to meet the goal of only 12 deaths per thousand live births, and to do so by 2030.

There are now also new goals for 2016 to 2030, focussing on child and adolescent health, while combating malnutrition is the aim of a decade-long program from 2016 to 2025. Better nutrition supports healthy physical and cognitive development.

Both communicable and non-communicable disease and illness feature in the report.

For example, significant progress has been made during the past decade, claims the WHO, against the devastation that HV, Malaria and TB cause. Specific figures given are a reduction in new cases by 18% for HIV, 21% for malaria and 16% for TB. Death rate reduction is 50% for HIV, 49% for Malaria and 25% for TB. The halving of death rate from malaria was achieved by prevention and better diagnosis and treatment.

Specifically, since 2004, more than 900 million bed nets impregnated with insecticide have been distributed in sub-Saharan Africa. Increased access to artemisinin-based combination therapies and rapid diagnostic tests are the other two contributing factors. The bed nets had the single greatest impact. Even more encouragingly, between 2007 and 2016, six countries formerly posing a risk for malaria were declared free of the disease. And 13 have reported no local case. Yet the disease remains endemic, and in 2015 caused 429,000 deaths out of 200 million cases.

[1] Healthier, Fairer, Safer. The global health journey 2007–2017
World Health Organization Publication date May 2017
http://who.int/publications/10-year-review/healthier-fairer-safer/en/

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ON PAGE 7 OF ITS REPORT, THE WHO SAYS 21 MILLION PEOPLE BECAME REFUGEES, THE MOST SINCE THE END OF WORLD WAR 2 IN 1945.

The 2030 goal set for Malaria by WHO is to reduce the incidence of malaria by 90% compared with 2015.

TB, the second of two success stories from the past decade, is a disease in which, despite good news, much remains to be done, particularly in the six countries in which 60% of TB occurs globally. The report singles out: India, China, Nigeria, Pakistan and South Africa. Malnutrition and tobacco smoking are two of the risk factors for TB.

WHO's "parent" body, the World Health Assembly, endorsed an "End TB Strategy" in 2014. That strategy's goal are: an 80% drop in incidence, and 90% reduction in mortality, while ensuring no household in which someone falls ill from TB faces catastrophic health-care costs. The latter falls within the sustainable development goal of making good quality health care affordable and accessible globally.

Somehow, to achieve the "End-TB-Strategy" goal, countries are going to have to seriously step up the sophistication of their health surveillance and reporting networks. Increased research and development efforts are also needed.

TB is an area of public health in which antimicrobial resistance plays a significant part. (See: Gavaghan H (2016): "UN General Assembly sets 2018 deadline for planners fighting anti-microbial resistance (AMR)", p13, Iss. 4 (Oct.–Dec.), *Science, People & Politics*, V VII (2017). http://www.gavaghancommunications.com/sppiss416p13.html Accessed 26th May, 2017.

WHO says fewer than half of all patients with multi-drug resistant TB, and one quarter of patients with extensive drug-resistant TB, are treated successfully. In 2017 the WHO is to hold a Ministerial conference on TB. That and output from a United Nations General Assembly meeting in 2018 may raise the political profile of TB. Something which the WHO thinks will help give TB the same visibility as HIV and Malaria, and thus attract more money, planning and scientific attention.

Neglected Tropical Diseases (NTD)

Just 17 diseases known as the neglected tropical diseases affect one billion (1 in 7) people on the planet in 149 countries. The NTDs cause disfigurement and long-term disability. The diseases, says the WHO, are neglected because they are not transmissible globally, are unseen by the affluent, because they occur in poor countries, and, because the countries are poor, their inhabitants have no voice among the rich.

This publication has argued for money to be disbursed to such countries inversely to IMF special drawing rights, so these poor countries have money to pay air fair and hotel bills of delegates to attend global meetings of WHO and other IGOs, where they can get their voice heard. See: Gavaghan. H (2014): "Was there no-one who could save Javert", p20, Iss 1 (Jan.- Mar), *Science, People & Politics* VV (2014).

NTDs (international organisations love their acronyms) include: Human African Trypanosomiasis, Chagas Disease, Visceral Leishmaniasis, Leprosy, Schistosomiasis, soil-transmitted Helminths, Trachoma, Onchocerciasis, Lymphatic Filariasis. Source; p19 of WHO report "Healthier, fairer, safer…"

A turning point, came, says WHO, with meetings and goals set in 2012 at a meeting in London among public and private organisations. The attendant "London Declaration" was widely reported. See:
London Declaration specifics, outlined on the Bill and Melinda Gates Foundation website. Accessed 26th May, 2017.
http://www.gatesfoundation.org/media-center/press-releases/2012/01/private-and-public-partners-unite-to-combat-10-neglected-tropical-diseases-by-2020

In the Americas, report WHO, since 2013 one country each year has eliminated River Blindness. Other disease-specific successes include a reduction to only 25 cases globally of Guinea Worm. Improved sanitation and water cleanliness are key, but far from the sole factors in defeating NTDs.

WHO mobilises to combat antimicrobial resistance (AMR)

Among the disease-causing microbes are bacteria, viruses and fungi. The problem of AMR is important enough to have attracted attention from the United Nations General Assembly. In spring 2016 the UNGA set WHO and other intergovernmental organisations the task of reporting back by 2018 with an action plan to defeat AMR. Resistance to microbial medication is thought by experts to have serious health and profound economic consequences.

Dr Margaret Chan, director General of WHO, has said countries need to be more prudent in their use of antibiotics in food animals. She pointed out that in response to concerns, the Chinese government has removed the growth promoter Colistin from feed additives. And by April 2017, 69 countries had finalised a National Action Plan on anti-microbial resistance.

Earlier–in February this year–WHO released a list of 12 anti-biotic resistant pathogens. Critically in need of breakthrough research are *Actinobacter baumannii*, *Pseudomonas aeruginosa* and Enterobacteriaceae. Though Tuberculosis is not on the list, the disease remains a high priority.

Actinobacter baumannii accounts for about 80% of reported infections, according to the US Centers for Disease Control and Prevention (CDC). Those with weakened immune systems, diabetes and open wounds are susceptible to infection. Outbreaks, says CDC, occur usually in intensive care units, or among very ill people. Pseudomonas, of which *Pseudomonas aeruginosa* is one, are becoming more difficult to treat, says CDC, which makes sense of why the pathogen is on the WHO hit list. Enterobacteriaceae, of which *E. coli* is an example, are a particular risk to patients who may need to be catheterised. High quality hygiene for health care workers, and properly cleaned instruments are the first line of defence against the pathogens. But the WHO hit list shows better science is also needed, and now.

War

Many health dilemmas are caused wholly by human behaviour in response to war. For example, conflict-driven migration, with all the ills associated with the health of displaced people, and the destabilising consequences of cholera and typhoid in war-torn locales are the two big-picture dilemmas facing world health, says WHO. The WHO report is clear-sighted in saying science and health policy alone cannot prevent solve some of the world's health problems.

FEATURE

Science and society of the Anthropocene: Transition from the Holocene

Introduction: It is easy to think we are special, and the present moment marks a special point in time, simply because of our presence. But on the geological scale of time, and taking 'us' to mean the human species, we could indeed be standing on the threshold of a new epoch - an age geologists are calling the Anthropocene. As geologist, Professor **Jan Zalasiewicz**, from The University of Leicester explains, it is an epoch of our own making.

The Anthropocene became part of international scientific discourse at a meeting of the International Geosphere-Biosphere Program (IGBP) in Mexico, in 2000. Paul Crutzen, the Nobel-Prize winning atmospheric chemist, became irritated as fellow scientists around the table talked of contemporary global changes in the Holocene, the epoch that marks the time since the Earth emerged from the last Ice Age. Crutzen could no longer contain himself. He burst out that we were no longer living in the Holocene but, and here he paused to try to think of some appropriate word, the Anthropocene.

It was a word he improvised on the spot, but it struck a chord. Scientists at that meeting began to discuss what it might mean. Crutzen himself pursued the idea, and checked if anybody else had come up with the term. He found the north American lake ecologist and specialist in diatoms (a kind of microscopic alga which makes a skeleton out of silica) Eugene Stoermer had used the same word for some years in conversations to reflect the widespread changes in lakes, which he deduced had happened over the past several decades.

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Picture Credit: Yasmin Yonan

Professor Jan Zalasiewicz, in his office at The University of Leicester.

Crutzen invited Stoermer to join him in writing a short article in the scientific literature. Stoermer agreed, and the term was published in 2000, in the bulletin of the IGBP, where it reached several thousand scientists involved in this programme.

Then in 2002, Crutzen reiterated the argument in a brief, vivid one-page article in the journal *Nature*, hence reaching a much larger audience of scientists worldwide. Though the two men never met, their brief collaboration was to have profound consequences as regards the scientific analysis of Earth history.

The basic premise was that the human-driven changes were now of such a scale as to take us out of the baseline conditions of the Holocene, and into the different baseline conditions of a new, emerging geological epoch. Those globally distributed human changes include transformation of much of the world's land surface into feedstock for humans, the re-engineering of most of the world's major rivers, the enormous increase in energy use, mostly from burning hydrocarbons, and ensuing changes to atmosphere and climate.

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The idea and term quickly caught on among the community working on contemporary global change. Earth-System science, in which the whole Earth is considered as a complex integrated system, was the central discipline. Here were atmospheric chemists like Crutzen himself, ecologists like Stoermer, oceanographers, glaciologists, and so on. The term began to be widely used, and published. It also began to spread more widely among the communities of the social sciences, arts and humanities, for the idea seemed to fundamentally reshape the connection between humans and nature.

Piquing the interest of geologists

The geological community was much slower to respond. This was in many ways not surprising. Geologists spend their working lives within the deep past of millions and even billions of years, where human timescales appear almost infinitesimally small. Over those geological timescales, the Earth has changed markedly: indeed, it has not so much been one planet, but rather a succession of different planets, each with its own kind of atmosphere, climate, geography, and assemblage of living organisms. Over the two centuries or so since geology emerged as a discipline, ideas that humans had affected Earth's geology had, occasionally, surfaced, each time to be met with rejection, and something near derision. How could something as seemingly brief and ephemeral as a human culture be placed on the same plane as, say, the opening and destruction of oceans, or the growth and erosion of giant mountain ranges?

There was another problem: geological time terms such as Jurassic or Pleistocene or Holocene do not lose or gain validity simply by the level of their use or disuse, as do the everyday words of our language. Rather, they are intensely formal constructs. They are words which are assessed and decided on, usually over decades of study and debate, by no less than four levels of bureaucratic scientific hierarchy, within the branch of geology termed stratigraphy.

In that discipline – stratigraphy – Earth's history can be teased out of rocks accessible today. What, within a given rock, properly belongs to one tranche of past geological time, and what to another? One piece of rock on Earth may have experienced many, or a few geological events, each event from a different stage in Earth history. Each event leaving marks of varying degrees of distinctiveness in the physicality of the rock. In other words, stratigraphy in the field is a little like archaeology, but explores events over an enormously greater time scale, and without the close focus on the affairs of a single species of hominoid.

Deep time

Geological time has a specific and unique structure. The Jurassic Period, comprising many millions of years of time, has a parallel Jurassic System, made up of the strata, minerals and fossils representing that almost unthinkably long time-period. This kind of time, a physical substance, made up of rocks, is called chronostratigraphy.

Hence, in geology, there is a twofold conceptualization of time, and a fixed procedure for matching physicality within formal time units. The Anthropocene emerged outside this kind of understanding, both philosophical and bureaucratic. Once its use became widespread in global-change, science circles, a central question arose. Was it geologically nonsense? Or, could it have meaning in geological terms – perhaps as far as one day being added, formally, to the Geological

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Time Scale? This would be a very big step to geologists, for whom the Geological Time Scale is the central defining structure of the science, a structure that holds the rest of it together. It would also be a very big step as regards the inherent meaning of the Anthropocene, giving it significance on a scale of many millions of years – almost inconceivably larger than any human, social or political time scale.

First step to a new epoch

The first geological examination of the term came a full eight years after Paul Crutzen's moment of improvisation, and several years after the word had begun to be used in the scientific literature. A commission of specialist stratigraphers of the Geological Society of London considered its meaning. This was simply a national body, and hence with no power over the Geological Time Scale (which is decided by international bodies). Nevertheless, it could consider the matter, and pass opinion, which it duly did.

Perhaps to its own surprise, 21 out of 22 of these specialists (chosen for their technical expertise, and not generally regarded as radical in outlook) considered that the Anthropocene 'had merit' as a potential formal geological time term, and should be considered further. The wording was typically cautious. Nevertheless, this tentative opinion, when published shortly afterwards by the Geological Society of America, attracted a good deal of attention. Among the fallout was an invitation to form an international body, the Anthropocene Working Group (AWG). Its task was – and still is - to analyse the potential of the term to be made part of the Geological Time Scale, and, in due course, to come up with relevant evidence, and to make appropriate recommendations.

The AWG itself has no power of decision – that belongs to all the hierarchical rungs above it: successively, the Sub-Commission on Quaternary Stratigraphy, the International Commission on Stratigraphy, and the International Union of Geological Sciences. All have to agree that the term not only possesses geological validity, but is also worth establishing *formally*. There is a difference between validity and utility: there are a number of geological time terms that are widely used, but which are informal – the Precambrian is one such.

The Builders

The AWG was set up, and remains, a unique body within the extensive stratigraphic bureaucracy that oversees the Geological Time Scale. All the other working groups and sub-commissions are wholly made up of specialists of particular units of strata and intervals of time: palaeontologists, geochemists, geochronologists. The Geological Time Scale is built by geologists, for geologists. Other communities simply accept the results – if they notice them at all – and have no say at all.

A new beginning

With the Anthropocene, things are different. First, many of the geological consequences around this concept have human causes or drivers, in one way or another: the (largely unintended) consequences of social, economic, industrial, political, military and other activities. This takes geology into terrain that, for most geologists, is unfamiliar.

Secondly, the deep interest in, and adoption of the Anthropocene concept by a broad range of

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Geologist, Jan Zalasiewicz, under surveillance!

Credit: University of Leicester

communities across the sciences and humanities meant this question could no longer be an in-house geological matter, to be discussed and resolved by geologists only. And, thirdly, because of the different perspectives from which the Anthropocene is now being considered, different Anthropocenes are emerging. The term has been invested with quite different meanings by different communities, or has been re-interpreted and renamed, as the 'Capitalocene', 'Pyrocene' and so on.

There was a circle to be squared here – or, perhaps, because of the multidimensional nature of the problem, a sphere to be cubed. Hence the AWG comprises geologists, but also Earth System scientists, archaeologists, geographers, soil scientists, polar scientists – and even an international lawyer. But, its remit remains the same as that for all other geological time intervals being analysed. The Anthropocene being considered by the AWG is what one might term the 'geological Anthropocene' or, more narrowly, the 'stratigraphic Anthropocene'. The question is whether the Anthropocene as devised by Crutzen and Stoermer – which took place outside of the

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geological community, and therefore not formulated according to the norms and procedures of that community, can work in classical geological terms, as a unit of both time and strata, and, moreover, can be thought useful (if so formalized) to that community.

The question of whether the potential formalization of the Anthropocene in geology needs to consider wider communities – or the social and human implications of this geological change – is still to be debated. It is a novel, and tricky, situation for this science.

The first step in considering a formal Anthropocene

After several years work, the AWG released its preliminary findings and recommendations to the last International Geological Congress, held in Cape Town in August 2016. The Anthropocene, they found, was geologically real, both in relation to the functioning of the Earth System and, crucially, as a unit of very recent strata that is quite distinct from earlier strata.

The science

Since the global 'Great Acceleration' – of population growth, industrialization and globalization - of the mid-20th century, layers of sediment at the bottom of the sea, on the floors of lakes and swamps and in river beds, have been marked by artificial radionuclides from the atom bomb tests of the 1950s and 1960s, by plastics, aluminium and concrete, by new pesticides and other persistent organic pollutants, and by fly ash as a byproduct of hydrocarbon burning.

In that time too, change in the world's animal and plant communities – which have been modified by humans since the Stone Age – accelerated markedly. Rates of species extinctions and invasions have increased, as ever more natural habitat was replaced by farmland or conurbations. The remains of these changed organisms are a palaeontological signal: future fossils, that are yet another sign of profound Earth-System change.

Acceleration

The scale and rate of this change is remarkable. Take the rate of increase of carbon dioxide in the atmosphere. This is an Earth-System change, the kind of thing emphasized by Paul Crutzen and his fellow scientists studying global change. Air might be thought an insubstantial thing compared with rock, yet it is preserved directly within one kind of rock – annual polar ice layers, as trapped bubbles – and, indirectly, within others, as chemical signals associated with fossil-fuel burning.

Both records show that the amount of increase of this gas in the atmosphere is now larger than the typical changes between the glacial and interglacial phases of the recent Ice Ages, and has taken place over a hundred times more quickly. This is without known precedent in Earth history, and the effects on climate are already evident, albeit still in their early stages.

Two things are significant here.

First the enormous release of energy from the burning of fossil fuels since the mid-20th

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century has powered many of the other changes of the Anthropocene, from the building of megacities to the energy-intensive production of the nitrogen fertilizers that keep about half of the Earth's population alive.

Earth's new trajectory

Secondly, this release of fossil energy, and all that is associated with it, is still taking place, and hence the Anthropocene is not a new stable state, as essentially was the preceding 11,700 years of the Holocene Epoch, but is a moving target, on its way to some new stable state that is likely to emerge in the distant geological future. The Earth is on a new trajectory, very different from any of the previous changes of the Ice Ages. This has implications for the scientific definition of the Anthropocene, but it clearly also has wider significance for the human communities caught up in this ongoing planetary change.

The definition, for now, is conservative. The Anthropocene is being considered as a potential epoch, a unit of modest level within the framework of the geological time scale – on a par with the Holocene - based on the changes that have happened until today. If a business-as-usual approach is to be continued with respect to such things as hydrocarbons burning and habitat loss, then the next century or two will very likely see both global warming to levels not seen for millions of years and a mass extinction event comparable to that when the dinosaurs died out. If so, the Anthropocene would then be on the scale of a period or an era – geologically a much bigger event, of the kind that only happens every few tens or hundreds of millions of years.

Locating the boundary

This consideration of formal hierarchical level within the Geological Time Scale is one kind of science currently being done around the Anthropocene. It is a formal question, and to some extent abstract – a little like the related question of when and where the beginning of the Anthropocene should be placed (somewhere in the mid-20th century seems the most pragmatic level geologically, but exactly where is work still in progress).

Resolving these questions is technical, detailed, background work, a little like establishing the exact length of the metre, or the speed of sound. It will not lead to great conceptual break-throughs, but is utterly necessary to provide a solid framework for more ambitious work. And it deals with geological consequences of the phenomenon, by way of categorising the nature of the strata that are forming in the Anthropocene.

Transition

The more exciting, and wide-ranging, science deals with the processes of how the Anthropocene emerged from the long, stable millennia of the Holocene: initially and slowly during the Industrial Revolution, and then apace, during the Great Acceleration, an acceleration which continues. Human society was developing, and civilizations grew and collapsed, many times through the passing millennia of the Holocene, without altering the fundamental character of the Earth System. It is the very sharpness of recent changes which makes the Anthropocene functional as a geological unit. But what caused this extraordinary lift-off, one that is transforming a planet's geology, and propelling it into a different kind of future?

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The answer clearly lies somewhere among the intersection of politics, economics, technological development, societal change and other factors, with the ever-more-rapid evolution of technology likely a prime factor, to the extent that it has been suggested to lie at the heart of the 'technosphere', a new Earth system, with its own dynamics (and with humans as components, perhaps, more than drivers), that has budded off – and may now be said to be parasitic on – the biosphere. To resolve these myriad forces, and work out how and why they are now the prime drivers of geological change on Earth, is where the humanities, social sciences and arts communities need to work together with the physical science communities.

Understanding the process is one thing. Given that the conditions of the evolving, unpredictable Anthropocene will affect all our lives, for many generations into the future, then means a way must be found to either modify its course (to prevent, that is, the most extreme, and lethal, possibilities of Earth System state) and to live, as best as possible, within the parameters that will emerge. Living across an active stratigraphic boundary is unlikely to be easy.

Thanks to the University of Leicester for locating photographs of Jan Zalasiewicz.

Thanks alos to deputy editor, Martin Redfern, for locating the photograph below of the K/T boundary of 65 millions years ago, and for writing the standfirst. Commissioning and line editor, Helen Gavaghan.
Original of photograph below is available under a Creative Commons License at the following URL https://commons.wikimedia.org/wiki/File:K-T_boundary_TLSP.jpg

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FEATURE

Grazed by history: Charles Darwin and The Beagle in a world of abolitionists

By Helen Gavaghan

HMS Beagle was refitted, according to the Royal Museums, Greenwich, from a 10-gun, Brig Sloop, to be a survey ship.

Between 1826 and 1830 the Beagle explored Patagonia and Tierra de Fuego. Next came the famous voyage around the world (1831-1836), with Charles Darwin on board. Darwin (1809–1882) was not yet the man he was to become in history.

Finally, the Beagle surveyed (1837-1843) large parts of the Australian Coast [1].

When the Beagle's Voyage started, Britain–then Great Britain, and in a troubled political Union with Ireland-

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Box 1: Suppressing the slave trade

For informed men and women of the early 1830s and through much of the 19th Century, suppression of the slave trade and abolition of slavery were the great humanitarian issues of their day; the backdrop to the world around which HMS Beagle carried Charles Darwin, when he made the observations which came to underpin his theory of evolution.

Though Beagle was a survey ship, it was a naval vessel. So, perhaps, over years of voyage, private conversation between Darwin and his hosts touched on slavery. He traveled near the height of Britain's antislavery activity, prosecuted globally via the Royal Navy, privateers (at times), Treaties, Courts and international law.

Writing in The *Yale Law Journal*, Jenny Martinez cites credible sources saying between 1807 and 1867 Britain spent 2% of its annual income per year to fight the slave trade. She quotes further reputable sources saying in the 1840s, between one sixth and one quarter of Royal Navy's vessels were engaged as antislavery patrols [4].

Darwin's voyage was parallel to one of humanity's greatest endeavours. HG

BIBLIOGRAPHY

[1] See: http://www.rmg.co.uk/discover/explore/hms-beagle. **Accessed 16th May, 2017.**

Authors's note. For this article I draw on British and Foreign State Papers in the volume for 1831-33 (primary sources) relating to the slave trade, mainly with Lord Palmerston, about the work by the Courts of Mixed Commissions and other things. The secondary sources are scholarly works about the Vice-Admiralty Court of Sierra Leone [3] and also the Courts of Mixed Commission [4]. These secondary sources, published in the *Yale Law Journal*, explore legal roots in issues relating to slavery, which have common roots for legal dilemmas today. As such they contain grist for the historian's mill.

[2] British and Foreign State Papers, 1832-33. Compiled by the Librarian and Keeper of the Papers. Foreign Office. Published by James Ridgway, Piccadilly, London (1836), and printed by J Harrison and son of Westminster, printers to the Foreign Office. The Volume comprises, "principal documents made public, relating to the political and commercial affairs of Nations" since termination of the war in 1814. The copy I have was digitized by Google, and shows that the original is stamped as being Library property of the University of Pennsylvania State University. An advert at the front of the Volume says the documents were assembled exclusively for government and diplomatic agents. When printed in 1836 they formed part of a series made public because of general interest in their content.

[3] Helfman. T (2006). "The Court of Vice Admiralty at Sierra Leone and the Abolition of the West Africa Slave Trade", pp 1122-1156. *The Yale Law Journal*, 115:1122 (2006).

[4] Martinez. J (2008). "Antislavery Courts and the Dawn of Human Rights Law", pp 550-641. *The Yale Law Journal,* 117:550 (2008).

BOX 2: The Law and slavery

The turning point for the international abolitionist movement came on 22nd June 1772, when, Lord Mansfield handed down his judgement in Somerset V. Stewart. [King's Bench]

After Lord Mansfield's judgment, enslavement on British soil ceased to be a defendable option. It would take a further century for the slave trade and institution to be stamped out by those nations having that intent, but, inexorably, now the law of nations on all fronts built its opposition globally to both the slave trade and the institution of slavery. In statute (positive law), in the Constitutions of new South American republics, in international treaties and via case law pushed to its limits in Admiralty Courts (Civil) and Prize Courts, the law of nature, which Mansfield let slip through, was squeezing the law of nations, until it capitulated, and expressly forbade slavery throughout the World. The Roman lawyer had won. This was not only a British story, but Britain paid heavily, and was an undoubted leader, in what the Nations said clearly in their legal instruments was a humanitarian endeavour, even as they used exceptions–Britain less so–to make the process gradual, rather than abrupt.

Before giving his opinion, Lord Mansfield had held over the case of Somerset v Stuart to consider the arguments. He had said, "If the parties will have judgment, 'fiat Justitia, ruat coelum' - let justice be done what ever be the consequences." He had given notice. The law, "not compassion or inconvenience", would guide his thinking. The potential for 'inconvenience' was considerable if Lord Mansfield found for the slave (James Somerset). Not only Britain's economy depended in part on African slave labour in tobacco and sugar plantations. Africans sold Africans. Ships of many nations plied the oceans, at first legally, and then in defiance of the law, and with what, on 30th November, 1831 the Brazilian publication, *Aurora Fluminence*, was to call, ".. this immoral lottery, this game in living packages of flesh and blood".

That was 50 years later. Now, in this story, it is still the Trinity Term of 1772. It is summer. A writ of *habeas corpus* had ensured the man whose humanity was a stake, James Somerset, had been removed from the chains in which his owner intended to convey him back to Jamaica to be sold. He had attended Lord Mansfield's Court as arguments unfolded which would decide his fate. The judge had thanked the young men of the bar who made their cases.

Judgment

"On the part of Sommersett (sic), the case which we gave notice should be decided this day, the Court now proceeds to give its opinion," said Lord Mansfield. Before uttering the words which will echo down the ages, his lordship briefly recapped arguments he had heard, and endorsed earlier decisions that there is no legal basis to support the idea that being a Christian ensured emancipation. Of slavery he said, "It is so odious, that nothing can be suffered to support it, but positive law. Whatever inconveniences, therefore, may follow from the decision, I cannot say this case is allowed or approved by the law of England; and therefore the black must be discharged."

The legal gap twixt positive laws through which Lord Mansfield slipped the law of nature was left for him, no doubt inadvertently, by the arguments on behalf of James Sommerset's "owner". Lord Mansfield's opinion reached the public domain, because Sommerset turned up in Court, and had not died before judgment, as in an earlier case before the Scottish Court.

Continued on page 19.

Lord Mansfield's opinion, delivered June 22nd, 1772
From The UK National Archives
http://www.nationalarchives.gov.uk/pathways/blackhistory/rights/transcripts/somerset_case.htm

Law and slavery continued

Twenty years after British case law took a stand, the Kingdom of Denmark and Norway became the first Sovereign state to take up pen in opposition to slavery. Shortly afterwards, Britain and the US enacted law curbing aspects of the slave trade. In May 1807 the Court of the Vice-Admiralty was established in Sierra Leone to adjudicate the fate of vessels captured off West Africa with slaves aboard, and to decide if the purpose was illicit. Not all slave trade was illegal.

As those aboard slave vessels were emancipated by the Vice-Admiralty Court of Sierra Leone, the problems of responsibility for them became apparent. These were people taken or sold from their homes, who did not have the language and skills for European life style, who were at risk of again being captured as slaves, and, who, even in their home, likely had no refuge. Local African leaders collaborated with the slavers.

Heading the Vice-Admiralty Court as its judge and frequent prosecutor was lone barrister, Robert Thorpe. He tried to make tractable and reconcilable the Law of the Sea and limited laws and Treaties against the slave trade. One case concerned a French slave-trading ship detained on the High Seas and taken to Freetown. Through his judicial role, Thorpe condemned the ship, but the owners appealed to London. He was overturned on the grounds that, in the absence of a threat to his jurisdiction's safety by Foreign slave trade, injustice did not justify injustice, in the eyes of the law, of taking the French ship. Such judgment left the British government with little choice but to negotiate Treaties with slave-trading nations.

By 1824 the government had decided to repeal all British anti-slavery legislations, and "An Act to amend and consolidate the laws relating to the Abolition of the Slave Trade" was signed off on 24th June, 1824. Included in the Act were the text of bilateral Treaties and their Conventions between Great Britain and, separately, The Netherlands, Portugal and Spain. These sought to curb the slave trade.
See:
http://www.legislation.gov.uk/ukpga/1824/113/pdfs/ukpga_18240113_en.pdf?text=slave%20slavery

By then Thorpe had returned to London, and the Vice-Admiralty Court of Sierra Leone* was replaced by a Mixed Commissions Court. These Mixed Commission Courts were established around the world, as the bi-lateral treaties to phase out the slave trade were negotiated. The Courts were run by equal numbers of people from each Treaty signatory nation. Each bilateral resulted in two Courts, one on the territory of each signatory nation. Their task was limited to determining the legality of a ship's detention, then subsequent confiscations and emancipations. The mixed Courts became very unpopular in a number of locations.

That is the world HMS Beagle made its way through, as it headed south, crossing the sea-lanes of licit and illicit slave-trade ships. No-one commanding a Royal Navy ship could have been ignorant of what a significant part of the fleet was doing, nor could an informed man, such as Charles Darwin, have been ignorant of the great humanitarian battle being waged globally.

What Darwin, aboard Beagle, could not have known during his Voyage was the content of Foreign Office correspondence about the suppression of slavery. See: This article. || HG

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*The 1824 Consolidation Act authorised the records of the Vice-Admiralty Court of Sierra Leone to be transferred to the Admiralty High Court Registry in England.

**"About suffering they were never wrong,
The Old Masters: how well they understood
Its human position; how it takes place
While someone else is eating or opening a window or just
walking dully along; …"**

WB Yeats. Musée des beaux art (1940) Correction: the poet is, of course, WH Auden, not Yeats.

… continued from page 17 ***"fiat justitia, ruat coelum"***

was fighting the slave trade, with other like-minded nations, on every front. It was all far from pretty, and the language and some ideas and motivations recorded in official documents [2] are not easy for the modern mind to relate to. In some instances, they can be misunderstood, such as on the subject of apprenticeships for emancipated slaves, where it could seem paid labour, with pay deferred, was simply an alternative form of exploitation. Lord Mansfield's judgment makes clear by transferable concepts that slavery is a step beyond even exploitation.

1832: Britain and Brazil clash over anti slave-trade strategies

On 7th November, 1831 the Brazilian legislature passed law setting Brazil at Diplomatic logger heads with Great Britain over the treatment of freed slaves.

Put simply, Brazil's policy was, with two exceptions, to free any slave entering Brazil, send them back to Africa, and make the importer – and that is the word used about those who had captured slaves and landed them in Brazil – pay for the return journey.

Britain's view, as expressed by officials, was that that was wrong, because it would subject the freed men, women and children to a second transatlantic journey. There was no guarantee where in Africa the freed slaves would be landed, nor that they would be in a friendly or hospitable location. Finally, they might be again captured as slave.

So, if one takes the Treaty and Statute language, the case law of Lord Mansfield, and arguments such as those above from lowly officials, it seems plausible that Britain's motives were humanitarian by at least some portions of society.

All parties do, however, agree that the locations and latitudes from which slaves had been captured were pestilential.

Charles Darwin time line.
http://www.lib.cam.ac.uk/exhibitions/Darwin/timeline.html
http://media.nationalarchives.gov.uk/index.php/darwins-voyage-hms-beagle-1831-6/

Box: 1831. Cuba accuses Britain of self interest, and is disquieted by emancipated slaves.

On 25th November, 1831 a note in the Official Diary of Havana described two emancipated slaves, who had run away from the keeping of Don Fermin Hernandez and Donna Teresa de Casa. Anyone who knowingly did not bring them back would be fined $500 'without prejudice to further proceedings', said the note.

One runaway was called Eufemio, the other Juan, but the official diary also identifies them by the name they were know as before being captured in Africa, and shipped in a slave vessel. Without saying which was which, the notice names one man as Emallelú. He was 24, and a member of the Lueumiello Nation. He was 3'2" tall, with a tattooed face. Cocú was 34-years old, with scars on buttocks and right leg. He was a member of the Apopó Nation.

Eufemio was No 170 of the Brigantine, *Orestes*, while Juan was No 372 of the *Firme*.

This information is in the British Foreign and State Papers of 1831-1832, under Foreign Office correspondence between Great Britain and Spain. The ultimate fate of the runaway men is not recorded in the source I am working with, but their status as emancipated means, probably, they were freed via a Mixed Commission Court when a Royal Navy ship captured the slave vessel carrying them. Likely, the Mixed Commission Court confiscated the vessel, and the slaves were released into some form of apprenticeship, for no more that 14 years. The idea being they would be equipped to support themselves in their new environment, and that their wages would be set aside for their future. In the meantime, they had board and lodging at least. At the end of their apprenticeship, the emancipated slaves would receive their manumission.

That was the way the legislation was supposed to work. Elsewhere in the correspondence, letters make clear it was not so easy. Emancipated slaves were, reportedly, resented in Havana by both free and enslaved blacks. Britain was viewed with suspicion, the assumption being that the Mixed Commission Courts – even though a result of negotiations – were a British anti-competitive ploy to protect her own commercial interests.

For those who do not accept Britain's official aim, stated in legislation and Treaties, which was humanitarian, clues as to additional possible motives for the very expensive policy are to be found in Foreign Office documents. Britain paid a small fortune in compensation for wrongfully seized ships, and deployed a large portion of the Navy on anti-slave trade activities.

That reason may well have been curbing the spread of highly infectious diseases. The British Policy meant the emancipated slaves lived "free" elsewhere than in Europe, where the institution of slavery was in disuse.

Consider for example: on 10th September *HMS Black Jake*, a Brig and tender to *HMS Dryad,* intercepted the Spanish Brig *Regulo*, which had left Havana with properly authorised paperwork. Yet Lieutenant Ramsay, commanding *Black Jake,* found 207 slaves on board, five of whom had small pox. On advice from the ship's surgeon, these five were landed on the River Bonny. The Court, because it had no record the five had been handed over to a proper authority, was unable to emancipate them, but it did free the others to the usual apprenticeship.

Locating exactly where all records of the Vice-Admiralty Court of Sierra Leone and the Mixed Commission Courts are could be a valuable epidemiological exercise.

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NEWS FEATURE

Regulatory approval strategies for high and moderate-risk medical devices in the age of "real world data"[1,2]

IN THIS NEWS ANALYSIS, HELEN GAVAGHAN [3] REPORTS AND CONTEXTUALISES A REVIEW ARTICLE IN THE *NEW ENGLAND JOURNAL OF MEDICINE* ABOUT UNIQUE CONSIDERATIONS FOR MEDICAL-DEVICE CLINICAL TRIALS, AND SPECULATES THAT IN THE POST-GENOMIC, BIG DATA ERA, WHEN DEVICES AND PHARMACEUTICALS ARE LIKELY TO BE HARDER TO DISTINGUISH FROM ONE ANOTHER, THE TIME MAY SOON BE RIGHT TO UNDERTAKE A ROOT AND BRANCH REVIEW OF THE BASIS OF MEDICAL-DEVICE LAW.

What might the risk to the patient be if a medical device works, is easy for the patient to use, and can be applied with no more instruction than a sticking plaster would need, yet the device has a function as complex and as critical as, say, a deep-brain stimulator? What if the device is coated with pharmaceuticals, or is itself indistinguishable from a pharmaceutical?

Additionally, imagine the design and engineering are so good that it is almost impossible to use the device incorrectly. Would device risk to the patient, as is the case now in the US, still be the proper criterion within which to frame a development and marketing regulatory process? "Regulators expect data that are provided by device manufacturers to reflect the risk profile of the device," write Owen Faris Ph.D and Jeffrey Shuren MD, JD in a paper in April in the *New England Journal of Medicine*.

In a world of Apps, WiFi, big data, precision engineering of antenna design, statistical advances, nanopores, angstrom-resolution molecular design, transcutaneous technologies etc… , the basis and method of medical-device law and regulation might need to be rethought.

Yet it is today's legal world with which Faris and Shuren are concerned. Among other things, they describe regulatory strategies concerned with future device regulation, even though those strategies were devised in response to yesterday's science. The science before apps and nanopores. Faris is clinical trials' director at the Office of Device Evaluation, which is part of the FDA's Center for Devices and Radiological Health (CDRH). Shuren is director of CDHR.

Risk is at the heart of US, medical-device regulation. Given the global reach of US medical device manufacturers, how devices are regulated in the US for market matters internationally.

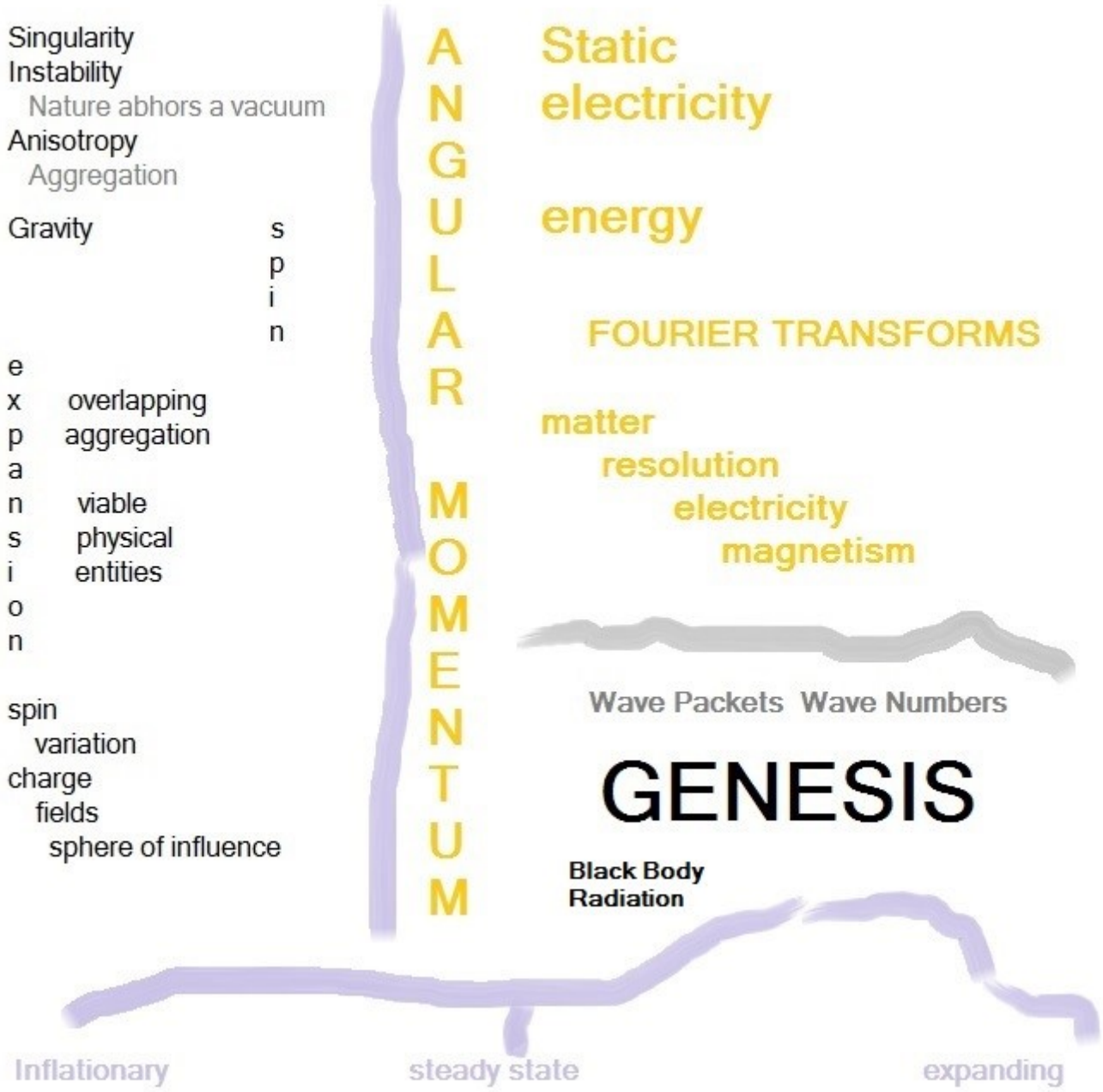
The question to be answered is, "what risk does the device pose "to the patient? Though risk itself seems likely to be a concept transferable to tomorrow's world of science and technology, whether the nature of risk - its attributes - will look the same in future as it does today is harder to pinpoint. Personalised medicine and stem cell developments could change the clinical, and so its legal and regulatory, landscape out of all recognition. At what stage in a sequence of clinical interventions is a medical device to be evaluated for risk, and how?

Today's regulatory approach, as Faris and Shuren write, was formalised by the 1976 Medical Devices Amendments to the Food, Drugs and Cosmetics Act. Failures with the Dalkon Shield, intrauterine device drove lawmakers. Even if that legal framework continues to be sound, 40

The FDA defines real world data as data collected from outside of traditional clinical trials: for example, registries of systematised observational studies of the device in practise. There are frequently reasons why traditional clinical trials, as devised in pharmaceutical regulation, are not suitable regulatory tools for medical devices.

Continued on page 26

The illustration opposite is called “From Genesis to ‘a slice in time’” INFOGRAPHIC



The art

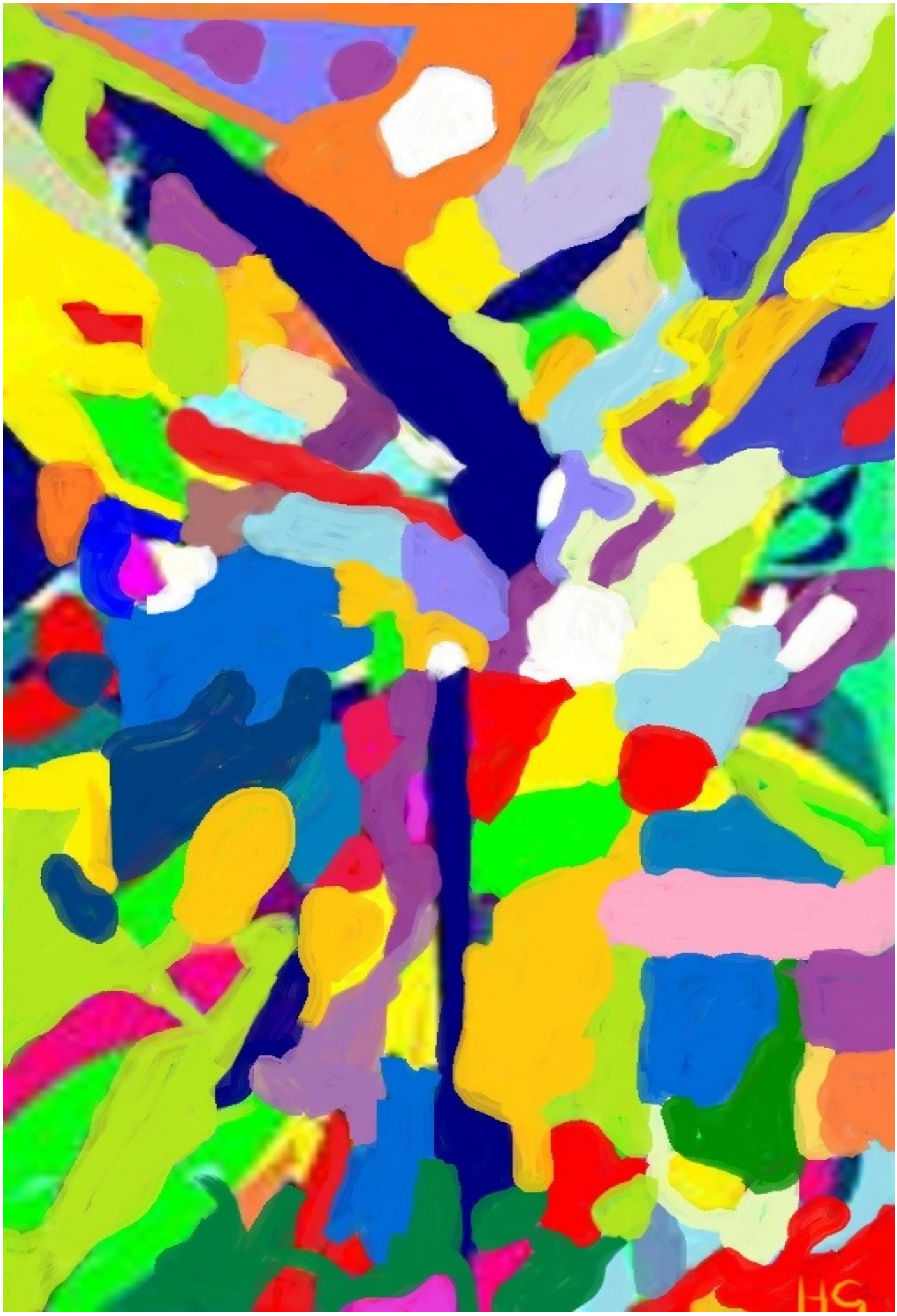
I used Microsoft paint to make overlapping shapes, then moved them around to depict radiation splurging from a central point. Next I resized and stretched the image, and shaped colours and lines as in the illustration opposite. I had in mind balancing singularity and black body radiation.

The illustration is based on concepts of science.

I was thinking how energy could become matter, how spin would emerge, and magnetism and electrical field lines might resolve and combine. Obviously visible radiation is a tiny part of the spectrum. In the illustration gamma rays are shown as indigo, and radio wavs are red. This is a slice in time. Lines and colours in my mind are consequential of radiation through diffraction, refraction, interference patterns, and follow gravity defined time-space lines.

But please feel free just to look at the illustration and enjoy its appearance without seeking meaning.

Credit infographic above and the illustration opposite: Helen Gavaghan©


HG

Continued from page 23.

years later, is the clinical trial strategy, risk assessment and pre- and post-marketing surveillance up to the task of ensuring the safety and efficacy of the medical devices possible in today's world? Is the assessment of data quality adequate to meet where it seems science and technology are enabling medicine to go? The real world data (RWD) of medical device assessment is very different from the carefully controlled and specified data collected in a randomised, double-blind, placebo-controlled drug trial.

Faris and Shuren address none of these questions and issues in their work, "An FDA viewpoint on Unique Considerations for Medical-Device Clinical Trials".

Instead they take and describe the regulatory approval strategy of two devices already on the market. The first example is traditional, and would be conceptually familiar to a drug company: it is a multi-center, 1820-patient, double-blind, randomised, phase-3, clinical trial comparing standardised implantable cardioverter-defibrillators with cardiac resynchronisation therapy plus defibrillator. The two-and-a-half year study results influenced guidance issued to clinicians.

By contrast it was not possible to take the "gold-standard" route of double-blind, randomised, placebo-controlled trial when evaluating in 2011 the first pacemaker designed so that patients could safely undergo magnetic resonance imaging scans. The danger to avoid was that radio frequency of the MRI would excite the pacemaker tip, leading to tissue ablation. In that case modelling, benchmarking and computer simulations replaced standard clinical trials. Sometimes regulation and market approval can be based on aggregated results from clinical practice-RWD.

How best to enhance regulation and trial design for medical devices has been a hot topic in the US since at least 2010. Little of what Faris and Shuren write in the *NEJM* in April is new. Bodies such as the Government Accountability Office (GAO), and the FDA itself, have made key observations and recommendations. Proposals for, among other things, unique identification numbers for devices and a national evaluation system have been in the pipeline for some time.

Slowly, some of these proposals are being implemented. Is the slowness of the routine variety associated with policy changes? Or are there deeper, unarticulated reasons which trouble industrial, research-based and medical practitioners alike?

It seems likely that with doctorates in philosophy, medicine and jurisprudence between them, Faris and Shuren will be aware the question of the transferability of the jurisprudential base of medical-device regulation to the post-genomic, Angstrom-world of chemistry needs explicit attention. It would make sense if Faris and Shuren undertook a root and branch evaluation of the process of getting medical devices safely to market. It could be interesting also to explore how one regulates a blurred interface between pharmaceuticals and devices, which it seems, inevitably, will emerge from the science and technology now being reported in the literature. Is now the time for such a review? Or is slowness in implementing regulatory recommendations more mundane, and an issue for system-change experts rather than lawmakers?

[1] Owen Faris Ph.D and Jeffrey Shuren MD, JD (2017). "An FDA Viewpoint on Unique Considerations for Medical-Device Clinical Trials", p1353, *New England Journal of Medicine,* 6th April, 2017. **DOI: 10.1056/NEJMra1512592**
[2] Use of Real-World Evidence to Support Regulatory Decision-Making for Medical Devices https://www.fda.gov/downloads/medicaldevices/deviceregulationandguidance/guidancedocuments/ucm513027.pdf (draft). **Accessed 19th May, 2017.**
[3] Helen Gavaghan is a former editor of *Clinica*, the weekly international medical devices and diagnostics newsletter when it had an associated database of daily content.

Ancient Hominin DNA hybridised and studied, yielding information in the absence of skeletal remains

In the journal *Science,* V Slon *et al* last month reported mammalian DNA hominin studies of samples from the Late and some Middle Pleistocene cave sediments.

With hybridisation techniques, and using probes, Slon and her colleagues successfully retrieved mitochondrial DNA. Hybridisation is a little like using sticky tape to catch flies. Only you need to think of the sticky tape as tailored for specific fly species.

The group write that encouragingly, "...this is possible also for samples that were stored at room temperature for several years."

Implications of this finding are that ancient mammalian DNA studies can now be undertaken on samples collected for a variety of other reasons.

If ancient mammalian DNA can be successfully studied by working with sediment samples in the absence of actual skeletal remains, the fields of biogeography, biogeology etc.. have a new powerful tool for following the trail of human ancestors and human evolution, and mapping where and when our ancestors lived.

A news feature giving more detail of this study will appear on the website

www.sciencepeopleandpolitics.com in early June.

To access the paper you need to be a member of the American Association for the Advancement of Science, or have library access. It becomes open access one year after publication.

Neanderthal and Denisovan DNA from Pleistocene sediments. V. Slon *et al*. First release in Science 27th April, 2017.

DOI: 10/1126/science.aam9695 (2017)

Donkey riding: When judicial advice could kill

The judge said, "Take your medicine", as he allowed the man in the dock to leave Court. I was there as press, waiting for the his honour to get to another case, the one in which I was interested professionally. Sometimes it doesn't matter which judge said the words, because they are words many judges say. Admonishment to take medication is widespread among the Crown Court judiciary I have reported, or followed in search of fodder for this column.

I find judicial presumption that the content of medical reports is sufficiently certain, particularly in the field of what is termed generally "mental" health, to justify judicial direction to be worrying for individual liberty and the advancement of medicine. I am on the side of medicine. I once worked every hour possible to win a place in medical school, and was offered one. Circumstances, not inability, precluded.

Recommendations by the judges that those before them take their medication are not a Court order. They carry gravitas, because of where they are said, and the context in which they are said. But a human being's humanity in Court is protected, because a human being can ignore judicial recommendations from the bench to take a drug the person addressed does not want. Medicine must never bend law to its will. Force is no substitute for a "bedside" manner.

Psychiatric drugs impact physical receptors, work with the brain's neurochemistry, and, often, the body's metabolism. Yet the brain is not properly understood. Actions and words that have nothing to do with a physical ailment or condition can be viewed as meaning the person must be ill, when they are not. Opinion and behaviourism – the latter imperfectly understood – still shape medical diagnoses of schizophrenia and bipolar disorder. The term psychosis is tossed around, without physical tests or understanding. The reality denied, not by the supposedly psychotic, but the one doing little more than guess that, because of family relationships or locale, the words said by a patient must be psychotic. In the field of "mental" health fear is pandered to by ignorance, and the ignorance is medical. And the medical profession know they are ignorant.

In psychiatric units poorly trained individuals, with little knowledge or medicine trail detained people – and I can attest such detention may well be without explanation or human decency - carrying clipboards, and recording god knows what, but nothing which can be of any value, given the non-existent medical training in those ticking the boxes.

Perfectly normal human beings, with lives destroyed because of medical ignorance, laziness, negligence, cultural arrogance and/or incompetence, are still hammered as square pegs into round holes by the medical profession, or those surrounding them, who, quite simply, think they are better that the person they seek to belittle through concern for their "health". That is the flip side to the current Royal desire to raise awareness about "mental" illness.

I posit it is unwise for a judge to encourage anyone to take their medication. Sign hospital Orders – yes. Ensure the person detained by medicine has access to a mental health lawyer who, as soon as a sentence for crime is served, bends every sinew to remove the detained person from a secure unit – yes. But encourage those said to be mentally ill to take psychiatric medication they do not wish to take – no. It is no part of the judicial role, surely, to pander to the current "mental" health circus. Let medics be the ones who kill by forcing drugs contraindicated for people with a familial history of stroke, for example, onto those whose lives they have destroyed by negligent misdiagnosis. Have no doubt, they do precisely that. **Helen Gavaghan**

Reporting restrictions lifted on 2016 case to defraud the Home officegv

Bradford, Crown Court, 24th April, 2017

His Honour Judge Durham-Hall QC today lifted reporting restrictions he had imposed on 21st September, 2016 in a case against people charged with common law conspiracy to defraud the Home Office.

The defendants named in the Court Order, who were found guilty by a jury at the Crown Court in Bradford before Christmas, are Bing Gong, Mohammed Basharat, Lin Hao and Lin Chen.

Today Lin Hao and Lin Chen entered pleas of not guilty to money laundering. The Crown asked for the charges to remain on file. Defence Counsel argued that given the specific circumstances that was legally inappropriate, but Judge Durham Hall upheld the Crown. His Honour did, however, thank Mr Christopher Tehrani QC for opposing the Crown, and acknowledged that eventually it might be that the issue could be revisited. From Counsel arguments it would seem that such a move could only be in the gift of the judge, and not via appeal.

After asking Counsel their views on lifting reporting restrictions, assorted press in Court heard Queens Counsel for the prosecution say they would, indeed, like reporting restrictions lifted, and that The Home Office had a press release pending.

The case involved also a company called Law Direct and Associates, with which the defendants named were involved, and had its origin in Leeds in the north of England.

Particulars of offences of which defendants named in the Court Order were found guilty included production of an array of false documentation, and events spanned the UK and China. During the trial police and Home office officials gave evidence. Defendants named in the Court Order on 21st September, 2016 pleaded not guilty at trial.

The Court Order restricting reporting was made when three co-defendants pleaded guilty during the same trial. *Science, People & Politics* reported that event in line with the judge's remarks made when he imposed the order.

From arguments today by Counsel it seems the current situation is that the prosecution has succeeded in its application to have charges lie on file without further trial, despite the ‘Not Guilty’ pleas entered today by Lin Hao and Lin Chen, and that only the trial judge might, as events unfold, alter that situation.

See:
Common Law Conspiracy to Defraud the Home Office, p37, Iss 4 (Oct-Nov), V VII (2016), *Science, People & Politics*.

HG

FROM BRITISH COURTS

Drug peddling and dangerous driving

Bradford Crown Court, 11th April, 2017

In the two news reports below I am not including the names of those sentenced today for crimes of, respectively, peddling Class A drugs (crack cocaine), and dangerous driving and driving without insurance. That is because the story arguably is not about the individuals who committed the crimes, but rather significant wrongs to society and its individual members that the actions of each convicted man is an example of. In both cases the sentencing judge was His Honour Judge Roger Thomas QC, the recorder of Bradford.

Dangerous driving and driving without insurance

An exasperated Judge Thomas QC showed no interest in sentencing the 19-year-old young man to anything other than an immediate custodial sentence. In his honour's opinion Bradfordians are exposed to too many young men driving dangerously, and he wanted to send a message to the wider community that such behaviour was unacceptable.

Presentencing, the prosecution played a short video in which the convicted man who was being sentenced was shown to do a three point turn on a dark road in front of a car, which turned out to be an unmarked police car with recording equipment. The police turned on their blue light, and pursued the vehicle which had performed the manoeuvre, but the driver did not stop. The police recorded the car's actions. The Court saw footage of the driver - holder of a full driving licence - weave down the road, swerving at one point from oncoming traffic, speeding away from the police, driving in a manner oblivious to the traffic calming measure of speed bumps, taking corners too fast, loosing control, mounting the pavement, bumping a bus stop, turning right and cutting up another driver legitimately doing the same thing, before being encouraged to a stop, and the car boxed in by the pursuing police car. Then, said the judge, the driver tried to run away. The driver said he panicked. The driver had no insurance, and had said when asked about this matter that he tried to get insurance, but couldn't. The judge concluded the driver was knowingly driving without insurance.

Having sent the young man down for four months, and imposed an obligatory driving disqualification and surcharge, his honour moved down his list.

Operation Saucer Lake and Babyline

In this case, the young man being sentenced had been caught up in a police operation to get dealing in Class A drugs off the streets of Keighley. The police operation was called Operation Saucer, and the police aim was to put an end to a sophisticated Class A supply operation called Babyline.

Defence counsel advocacy on behalf of the client, plus the client's remorse, his somewhat lesser role in Babyline, and the client's early plea of guilty reduced the length of his sentence to four concurrent 27-month custodial sentences imposed immediately.

The prosecution outlined the sales made by the man sent down, which were made to an undercover police officer. The crack cocaine supplied was 68 percent, 71 percent, and then 75 percent purity. Each sale was £10.00.

This case was one of several in which people were prosecuted as a result of Operation Saucer Lake, and this particular person was arrested at Heathrow before boarding a plane to India. **HG**

QUIZ

April – July, 2017.

1. On what date was Emmanuel Macron inaugurated as the President of France?
2. Who did Emmanuel Macron take over from as President of France?
3. At the time of Emmanuel Macron's inauguration as the President of France, who was Chancellor of Germany?
4. Who was Prime Minister of Japan on 1st May, 2017?
5. Who was President of the Russian National Academy of Science on 1st May, 2017?
6. What is the name of the cyber threat which stuck globally in early May, 2017?
7. In 2015 how many people did the United Nations High Commission on Refugees [UNHCR] report that there were in the world?
8. Does Saudi Arabia permit the sentencing of juveniles to a death penalty? What are the permitted methods of execution? Must the juvenile attain their majority before execution?
9. In April, 2017 what were researchers from the Max Planck Institute for Evolutionary Anthropology in Leipzig reported to have accomplished?
10. What did the Indian Space Research Organisation (ISRO) launch atop its Geo-synchronous Launch Vehicle on 5th May, 2017 from the Satish Dhawan Space Centre?

ANSWERS

1. 5th May, 2017. **Source:** [Live report on BBC News].
2. François Hollande. **Source:** Live news reports on reputable TV news channels.
3. Angela Merkel. **Source:** Live news reports on reputable TV news channels.
4. Shinzō Abe. **Source:**
5. Kozlov Valery Vasiliviech. Physical and mathematical sciences. **Source**: http://www.ras.ru/win/db/show_per.asp?P=.id-837.ln-en
6. Ransomware.
7. 21.3 million. **Source**: http://www.unhcr.org/uk/figures-at-a-glance.html
8. I have not yet had time to put these questions to the press office of the Embassy of the of Saudi Arabia. We hope to bring you the answers in the next issue.
9. A method to recover the ancient DNA of extinct hominin's in the absence of skeletal remains. **Source:** Max Planck Gesellschaft. https://www.mpg.de/11247830/dna-cave-sediments
10. South East Asia Satellite. Weighing in at well over 2 tonnes, the satellite is known also as GSAT-9. It is a multiband communication satellite. **Source**: India's Department of Space. http://isro.gov.in/update/05-may-2017/gslv-successfully-launches-south-asia-satellite

The editor, Helen Gavaghan, of this publication has a decades-long track record of reporting and editing, with specialty in science and technology nationally and internationally .

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