

Science, People & Politics Issue 2 (April-June)  
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Next issue 3 (July-September)

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## **IN THIS ISSUE**

**Sterling in mid  
20th century**

**And**

**Newest frontier in antibiotic research**

**And**

**From British Courts**

Science, People & Politics

Issue 2 (April—June) 2016

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The illustration is resized from an original,  
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[WWW.GAVAGHANCOMMUNICATIONS.COM](http://WWW.GAVAGHANCOMMUNICATIONS.COM),  
and was inspired by a drive I took past  
RAF Fylingdales in North Yorkshire in 2004.

The moors, clear skies, and a lone policewoman  
in marked car outside the compound inspired the  
illustration.

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# Editorial: Money supply, Sovereignty & Democracy

Strong, consensual administrative units which control currency blocks and negotiate price and exchange-rate agreements between and among those blocks are essential if money supply into and around currency blocks is to map fairly and accurately to national need and resources. If groups other than Sovereign governments, responsible to those who, simply because they exist justify creation of the money, decide how much money and what kind to circulate within the given administrative unit then money supply is not controlled. Something other is determining what money supply is available for the buying and selling of goods, for saving, taxation and national expenditure for the common good. Money is what we use nationally and internationally to play fair with one another in individual transactions and collectively. With it we show both love and hatred, the intent to empower or to control. If we were perfect beings we wouldn't need money.

A controlled money supply might comprise coins, paper, material, digital, local and/or supranational, and/or binational, but, axiomatically, the supply – how much exists – needs to be controlled by Sovereign governments for the control of money supply to exist and for money supply to be controlled. A controlled money supply cannot inflate or make purchasing-power transactions independently of government-controlled money supply if governments are to retain management of their economies, their fiscal policies, their monetary policy and their international relations. The management might be direct or exercised through appointed bodies whose existence can be altered legislatively.

Creating uncontrolled, ie unmanaged, money supplies distorts economies, irrespective of whether out-of-control money supply is legal or illegal. Examples of uncontrolled money supply, where money supply has the attributes of enabling transactions or the accumulation of wealth, include, in my reading of current affairs and history, such things as illegal drugs, contraband or large chunks of capital in the form of property or goods which cannot generate revenue streams or justify collateral in synch with nominal value. Not only do such uncontrolled money supplies undermine the management of economies, they also stress and sometimes shatter international relationships undertaken through instruments such as currency exchange rates. In other words, an uncontrolled money supply might not be illegal, but simply money which has become unexpectedly damned because of a disaster, such as an economic landslide. Just as geological disturbances revealed Earth's fault lines manifest in plate tectonic maps, so capital damned without anthropomorphic intent can reveal global economic fault lines.

Nor, surely, does a given geographical area need to have only one money supply, nor an area be defined only by latitude and longitude, because what is needed to control money supply is representative Sovereign power, and people, not geolocation, determine what constitutes a sustainable Sovereign power. HG

## READER UPDATE

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Patient readers and supporters of our efforts to establish *Science, People & Politics* as a viable, sustainable profit making editorial product might be pleased to know a way forward compatible with legal deposit, customs and excise and IT is emerging. We'll keep you posted. The shareholders of Science, People and Politics Ltd. Co. No. 0590-1911 (Registered in England), the non-trading owner of *Science, People & Politics* ISSN 1751-598X, thank you for your patience. The publication is a hybrid of journal and magazine, a scientifically literate humanities quarterly aimed primarily at scientists and politicians internationally. Some sections of the magazine are published throughout the quarter as individual news items, and moved on publication date to the title.

# STERLING IN MID-20<sup>TH</sup> CENTURY

By Helen Gavaghan, editor of *Science, People & Politics*

CONTROLLED MONEY SUPPLY IS A TOOL HUMANITY HAS DEVELOPED, AND IS EVOLVING, IN ITS BATTLE AGAINST WAR AND SLAVERY. AS THE UK PREPARES TO VOTE ON 23RD JUNE 2016 ON WHETHER TO LEAVE THE EUROPEAN UNION *SCIENCE, PEOPLE & POLITICS* LOOKS BACK TO THE YEARS IMMEDIATELY FOLLOWING WORLD WAR II, WHICH SAW THE START OF THE TRANSITION TOWARD INTERNATIONALIZING MONEY SUPPLY AS A TOOL OF PEACE.

## PRE WWII

"The Sterling area was known in the 1930's as the Sterling bloc. It then consisted of a somewhat larger group of countries (not entirely Dominions or parts of the British Commonwealth) which conducted a large part of their trade in Sterling and held their reserves predominantly in Sterling." (2)

## DURING WWII

"The exchange control imposed during the 1939-45 War was wide ranging in its influence: it affected the foreign assets of people living in this country; the Sterling assets of those living outside the Sterling area; and all monetary transactions between the United Kingdom and countries outside the Sterling area." (2)

## 1947

"The Scheduled Territories now comprise the British Commonwealth (except Canada and Rhodesia), the Irish Republic, British Trust Territories, British Protectorates and Protected States, Iceland, the Hashemite Kingdom of Jordan, Kuwait, Libya, South Africa and South West Africa, and Western Samoa." (2)

P246 of a chapter entitled "The U.K. exchange control: a short history" published 1967 and online at: <http://www.bankofengland.co.uk/archive/Documents/historicpubs/gb/1967/gb67g3245260.pdf>

Accessed 27<sup>th</sup> May, 2016.

In 1947 the UK passed **The Exchange Control Act** in response to a balance of trade crisis. That act established controls on gold, currency, securities, imports, exports, and payments, among other things. Within Schedule 1 the Act (1) defines the Sterling area as the UK, Dominions, as defined by the 1931 Statute of Westminster (excluding Canada and Newfoundland), Dominions not defined by the Statute of Westminster, as well as Iraq, Egypt, Transjordan, Iceland, The Faroes, countries where the UK had a League of Nations mandate, British protectorates and the Anglo-Egyptian Sudan. There should be 11 countries or categories in total.

The 1947 Act comingles with remnants of WWII currency control.

In the WWII context, currency meant either cash or securities assets. The most significant WWII currency-control was that holdings *by UK resident* of cash or securities in currencies effective for making overseas payment had to be offered to the Treasury in exchange for Sterling at an official rate. Resident meant where one normally lived, and residents were not necessarily nationals. Not surprisingly, the intent of WWII restrictions was to finance the war effort.

Those countries thought to have currencies with credibility for overseas payments were specified just before the war as: Argentina, Belgium, Canada, France, the Netherlands and the Dutch East Indies, Norway, Sweden, Switzerland and the United States. These were the countries with specified currencies. Soon afterwards the Dutch West Indies, Belgian Congo, Newfoundland, Panama, the Philippine Islands and Portugal were added. By April 1967, writes the Bank of England (2), in a history of currency control and the UK, all countries were listed as having specified currencies.

Securities held by UK residents in specified currencies were known as restricted, and had to be registered. In 1940 the Treasury bought many, particularly, writes the Bank of England, those securities in US or Canadian dollars. That is, the securities were vested, and later sold overseas to pay for the War, or held as part of the UK Treasury's portfolio of dollar assets.

Then in May and June, Holland and France fell; much of Western Europe was under Nazi occupation, and British and French troops evacuated from Dunkirk. Severe restrictions were now placed on the transfer of securities to and from non-residents to prevent, writes the Bank of England, stolen securities being sold in London.

To defend the value of Sterling and prevent it being undermined by free markets, and thus, coincidentally, also defending other countries' Sterling holdings, the UK made bilateral agreements with countries such as Argentina, to filter international transactions at official exchange rates through special accounts. Sterling balances on many special accounts could not be converted. Similar official accounts set up in bilateral agreements with the US and Switzerland did allow conversion between Sterling and dollars or Sterling and francs.

From time to time in Foreign Office records about the Falkland Islands or Antarctica, which discuss Anglo-Argentine relationships, more than one British official remarks on Argentina taking advantage of Britain while at war with Germany. Yet shipping beef to the UK, as Argentina did, buying military equipment and freely entering bilateral agreements with Britain at least raises the possibility that there was more than one side to Anglo-Argentine relationships. Argentina was neutral until nearly the end of the war, and then was a founding member of the United Nations.

In the immediate post war years when reconstruction and food not War funding were most important Britain negotiated monetary agreements which protected the Treasury's gold reserves, while relaxing wartime restrictions on Sterling and transfers to third parties. Monetary authorities of certain countries were allowed to acquire one another's' currency at official rates up to an agreed level. Balances above that level could be settled with gold. With the consent of both parties Sterling could be transferred to the monetary authority of third parties. The main remaining restriction was that the transactions be current and for current purposes.

This more liberal currency regime quickly went into reverse, because of strong demand for dollar goods, and a dollar shortage. Sterling began to be used as a form of loss leader. Profit was made by buying Sterling area commodities at a premium with Sterling, then selling at less than market value for dollars, but nevertheless at a dollar price which realized profit by exceeding the loss incurred by having paid a premium price with Sterling.

Somehow pricing had got out of kilter. The resulting imbalance was corrected in the first instance by insisting that current transactions for current purposes should additionally mean payment was made only to the country in which the goods and services being purchased had originated. Then in 1949 Sterling was devalued by 30 percent from \$4.03 to the pound to \$2.80. Ten years after that non-residents could once again convert Sterling, and personal travel allowances per adult and child had been re-instated then increased. That policy change, writes the Bank of England, impacted the balance of payments. The currency conversion world was beginning to look a little more familiar to the modern eye.

## **ASSETS DURING WAR**

Between the end of WWII and conversion of sterling in 1958 for non-residents Britain survived the Suez crisis, devaluation and balance of payment crises, all without re-instating the strict WWII currency exchange controls. In line with the 1952 meeting of heads of the Commonwealth the UK moved gradually back to full Sterling convertibility.

One can see that, depending on the amounts of specified currency assets held by UK residents, wartime restrictions formalized the relationship between Sterling and local currencies in a way which could reduce UK government vulnerability to non-Sterling holdings in listed territories. Also, depending on the amounts involved, overseas governments minting and promoting creation of currency assets could, presumably, have benefited from a reduction in outflow of assets from their own currency.

## FURTHER READING

1. Exchange Control Act, 1947. UK Legislation, accessible via the National Archives. [http://www.legislation.gov.uk/ukpga/1947/14/pdfs/ukpga\\_19470014\\_en.pdf](http://www.legislation.gov.uk/ukpga/1947/14/pdfs/ukpga_19470014_en.pdf)  
ACCESSED 27TH MAY, 2016.
2. The U.K. exchange control: a short history. Archived on the Bank of England website <http://www.bankofengland.co.uk/archive/Documents/historicpubs/qb/1967/qb67q3245260.pdf>  
ACCESSED 27TH MAY, 2016.
3. COLONIAL STERLING EXCHANGE STANDARD. INTERNATIONAL MONETARY FUND STAFF PAPER.  
When some years ago I first came across this 1952 paper by H.A.Shannon it was "open access", and I was able to download and print it at no expense, by my own labour and using my resources. The paper is no longer so easily accessible, and requires either payment or the non-obvious setting up of a free JSTOR account for minimal and strictly controlled JSTOR access. (Access restriction checked 27th May, 2016). As a citizen I think that is wholly wrong. And that papers placed in the public domain by IMF staff writers should be on the IMF website, and free to all the World. Anything other is interpretable as censorship.
4. United Kingdom - Economic position and prospects (English). The World Bank website. <http://documents.worldbank.org/curated/en/1961/02/724432/united-kingdom-economic-position-prospects>  
This is a 1961 document prepared by the International Bank for Reconstruction and Development.  
ACCESSED 27TH MAY, 2016.

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## ICT UPTAKE CORRELATES WITH NATIONAL ECONOMIC PROSPERITY

*This article published online in 2015. It is published in this issue of Science, People & Politics in shortened form because of its continued relevance.*

By Helen Gavaghan

**Top of the World Economic Forum's 2015 Network Readiness Index** measuring ability to leverage information and communication technology (ICT) is Singapore<sup>1</sup>. Chad is last, while the US and UK are, respectively, 7th and 8th. Analysis shows the general correlation between ICT competence and economic development, and that digital divides of have and have nots persist in the world's most developed and ICT savvy countries.

"To leverage ICT for development better infrastructure and access are needed...", write the authors in the executive summary.

The 2015 Global Information Technology (WEF) report is the 15th since 2001. Each drills into national regulatory environment, physical infrastructure, cyber security and social plus educational preparedness. Some 13,000 business executives from large companies in each of the 143 countries - representing 98.4 per cent of GDP - completed the survey, intended to provide information about a nation's operating environment.

Noting that, "we are living in a world of unparalleled digital infrastructure, the executive summary writes, "Some segments of the population may be exposed differently than others to labour market shifts induced by technological innovation, which can aggravate inequalities across groups with different levels of skills."

Although there are nearly as many mobiles on the planet as there are people, not everyone has one. WEF reports that the International Telecommunication Union (ITU) estimates 48 percent penetration to individuals in developed countries, and 30 percent in the developing world. Of those mobiles only a small portion are of the



Ananke and Tyche, the science section of Science, People & Politics

# Ribosomes – life's Rosetta stone – reveal vulnerabilities and offer path to new antibiotics

By Helen Gavaghan\*

**BY BETTER UNDERSTANDING THE STRUCTURAL INTERACTIONS OF MOLECULES IN BACTERIA'S RESPONSE TO STRESS, RESEARCHERS ARE PIONEERING PATHS TO URGENTLY NEEDED NEW ANTIBIOTICS**

"In principle, codon-anticodon recognition is a straightforward process involving base-pairing between the anticodon of the tRNA and the codon of the mRNA. The specificity of amino acylation ensures that the tRNA carries the amino acid denoted by the codon that it pairs with, and the ribosome controls the topology."

PP 238-239, T.A.Brown. Genome. 1999. Bios Scientific Publishing Ltd. Oxford, UK.

**Nobel laureate Venkatraman Ramakrishnan, a biophysicist** and President of Britain's national academy of science, earlier this month reported at atomic resolutions the three-dimensional structures associated with the bacterial stress response known as stringent control. Found deep inside the genetic reproductive machinery which makes the proteins essential to life, stringent control enhances microbial virulence.

New antibiotics are what Ramakrishnan and his colleagues think their work could lead to, because one possible therapeutic target protein, RelA, which the group has now mapped in situ, is found only in bacteria.

Claiming equal contribution to their research, the authors posit, "... a framework for the development of therapeutics that can selectively inactivate stringent control and re-sensitize resilient bacteria to antibiotics".

"Stringent control is a pleiotropic response to the failure of amino acid availability to keep up with the demand of protein synthesis," they write. Different authorities define pleiotropy variously in a number of contexts. Here the authors are ruling out other contextual meanings, as well as explicitly linking their new structural observations in the bacterium, *E. Coli*, in a causative and explanatory way, to depletion in amino acid levels. The pleiotropic response they mean is to be found in the structure and the incompletely understood biological mechanisms associated with that structure.

International science journal, *Nature*, published their report online on 9<sup>th</sup> May this month under the heading "Ribosome-dependent activation of stringent control". Co-authors Alan Brown and Yuliya Gordiyenko, like Ramakrishnan, are at the MRC Laboratory of Molecular Biology at the University of Cambridge in the UK. The fourth researcher, Israel Fernández, is now at the department of biochemistry and molecular biophysics at Columbia University in New York.

Ramakrishnan received his Nobel prize in chemistry in 2009 for crystallographic investigation elucidating the structure and function of ribosomes. These biomolecules are made of proteins and of the nucleotides in the genetic code DNA and its translational machinery, RNA. Ribosomes occur in all living organisms from bacteria to plants and animals. They are central to sexual and asexual reproduction. Ribosome are where the message in DNA is converted into the proteins of life.

Microbial stringent response to amino acid depletion occurs in and close to ribosomes. As part of the response, the microbes' physiology changes. Compounds known as alarmones form, and act as global regulators, blocking normal biosynthesis. Gene expression patterns alter, and enhance bacterial virulence.

Biochemically the stringent response was known about as early as 1952, as Ramakrishnan and his colleagues acknowledge in their introductory assertion that "stringent control represents a key bac-

terial response to nutrient starvation”.

The findings Ramakrishnan and colleagues are relying on are by Margot Sands and Richard Roberts, and were published in 1952 in the *Journal of Bacteriology*. Sands and Roberts measured the metabolism of “a mutant of *Escherichia coli* requiring tryptophan and histidine”, and observed reduction to 10 percent of normal tryptophan and histidine synthesis, and nucleic acid synthesis at 25 percent of normal. They concluded protein synthesis and nucleic acid synthesis are partially independent.

During the experiment Sands and Roberts noted residual production of both tryptophan and histidine, which they thought could be break down products of other amino acids. Sands and Roberts observed also that the culture survived for up to 6 hours with its altered physiology.

Mechanistic and structural details explaining Sands and Roberts observations were, inevitably, unknown and unknowable then, because knowledge of the structure of the genetic material, DNA and RNA, had not yet opened the way for today’s genomics. Not, as everyone knows, until 1957 did James Watson and Francis Crick triumphantly make the breakthrough of defining the double helix structure, starting a medical revolution still underway. From the perspective of an historian of science it is interesting too that Sands and Roberts were working in the days before recombinant technology.

Now structure at all scale is known to be as important to the integrity and function and mechanics of biological macromolecules and their interactions *in vivo* as it is in architecture. Mismatch dimensions and material properties, get the math or arithmetic wrong and flaws bring down the whole building or macromolecule, radically altering functionality in situ, or relationship to function.

Yet deliberately altering structure is exactly what Ramakrishnan and colleagues have done. To better understand their research it helps to know the part ribosome play in producing proteins in a normal, biologically stress free environment having no amino acid deficiency.

After messenger RNA (mRNA) is copied from the genetic code of DNA it binds to the smaller of two subunits in the ribosome. Three nucleotides in the mRNA, known as a codon, code for an amino acid protein building block. 20 amino acids in different combinations and numbers are involved in making all the proteins of life.

Ribosomes cycle through a process bringing together the small ribosomal subunit, with mRNA attached, and a larger ribosomal subunit. Before these two can complete their work together by creating a protein, a third component is needed. That component is called transfer RNA (tRNA), a 75 to 95 nucleotide-long molecule which attaches an amino acid to an acceptor arm, and ferries individual amino acids to the ribosome, where they are added together in the order determined by mRNA to make different proteins.

In two dimensions, tRNA can be represented as a four-leaf clover, with the acceptor arm as one leaf. Three nucleotides, which are the opposites of codons, are found on another of the clover’s leaves. That is, the tRNA has an anticodon. With a very high degree of fidelity the amino acid picked up by a tRNA is the amino acid coded for by the messenger RNA codon which matches the anticodon on that tRNA. That is, if the tRNA anticodon chemically matches a mRNA codon for phenylalanine, there is a high probability the amino acid the tRNA has picked up is also phenylalanine. The word describing the correspondence between the mRNA codon which the tRNA anticodon matches, and the amino acid the tRNA has picked up is cognate.

Three ribosomal locations in addition to where the mRNA is docked on the small ribosomal subunit are involved in converting mRNA’s message into individual proteins. These are called the A-site, the peptidyl site (P), where amino acid units are joined together, and the E site, ie exit, from which finished protein are released.

tRNA, which in three dimensions looks like a golf club, “charged” with an amino acid enters the ribosomal A-site if its anticodon is a match for the mRNA codon clamped in place on the ribosome. The amino acid carried by the tRNA is then in position to link up with any previous amino acid recruited by the ribosome’s A-site, and passed on to the P site, where bonds between amino acids are formed. When the codon presented by the mRNA codes for an amino acid bringing the pro-

cedure to a halt, the finished protein is released. Enzymes which have fueled the procedure are also released, and the ribosomal sub units split apart so that the process can begin again with a new piece of mRNA.

That is the normal process.

If the mRNA does not have a stop codon, the ribosome gets stuck, that is, it becomes stalled, and needs to be rescued. There are a number of reasons why ribosomes stall. Having an uncharged tRNA, one without an amino acid on its acceptor arm, is one cause.

For their stringent-response investigation Ramakrishnan and colleagues worked with up to date tools, including synthesized uncharged tRNA. When a tRNA has an amino acid on its acceptor arm it is said to be aminoacylated, or charged.

RelA, the protein the group think could, in complex with a stalled ribosome provide a framework for antibiotic research, was expressed recombinantly in *E. Coli*. Separately, the ribosomes were isolated by centrifugation from *E.Coli*, following cell disruption by sonication. Codons were added to a chemically synthesized mRNA, and tRNAs, with and without attached amino acids, were produced. The whole was made into a synthesized complex and examined by cryo electron microscopy. *In silico* "manipulations" based on probabilities enhanced contrast and clarity. A far cry from the type of methods applied 64 years ago by Sands and Roberts when they established the existence of the stringent response, but the two groups were exploring the same phenomenon, stringent response, and within the same organism – *E.Coli*.

When the ribosome stalls the RelA wraps itself around and stimulates production of alarmones, which are energy-storing compounds called guanosine tetra or penta phosphate [(p)ppGpp – hyper phosphorylated guanine homologue)]. (p)ppGpp mediates the stringent response. When biologists use the verb mediate they usually means they do not know how what they are observing happens. And that is the case in this work by Ramakrishnan and colleagues.

Though *E.Coli* bacteria are, according to the USA's National Institute of Allergy and Infectious Disease (NIAID), responsible for nearly all urinary tract infections, finding a cure was not the focus of either Sands and Roberts in 1952 or Ramakrishnan and colleagues this year.

The stringent response gives the bacteria a survival chance and increases its virulence. Ramakrishnan and colleagues argue that since RelA is confined to bacteria, the structure it takes up when binding to the ribosome provides a framework for researching a way of selectively inactivating stringent control so that the bacteria making use of this mechanism are again susceptible and vulnerable to antibiotics.

Others have questioned whether targeting stringent control is a good idea in the search for anti-virulence therapeutics, because of the commonality of (p)ppGpp in normal protein biosynthesis.

Interestingly, and *en passant*, the team report that during model verification they were unable to repeat an observation made by another group in 2007, which had identified a second paromomycin binding site on the large ribosomal subunit. Paromomycin is a 1950s antibiotic no longer in widespread use. Ramakrishnan's group identified only one Paromomycin binding site.

They further observe that a molecular bridge between main subunits of the ribosome, called an A-site finger (ASF), shares topology with an RNA recognition motif which, when bound to a particular protein feature, is common in eukaryotes.

The meaning of these two subsidiary observations made in, respectively, the methods and in the main text of the paper, are not explored by the authors. But that is not unusual in a scientific paper, where speculating ahead of the data and over interpreting an observation are frowned on.

\*Reporter and correspondent for the science section, Ananke and Tyche, of *Science, People & Politics*

## A balance of differential and integral calculus

Report of Cliff Jones' inaugural professorial lecture at University of Leeds on 5th April, 2016. LCDs and entrepreneurship. Published online 6th April, 2016.

**Introduced by Professor John Fisher**, deputy vice chancellor of the University of Leeds, Cliff Jones yesterday evening delivered his inaugural professorial lecture in the University's conference centre.

The topic was liquid crystal displays (LCDs), and students, industrial and academic scientists from around the country listened attentively as he wove a story of LCD physics, chemistry and commercial significance.

Matters corporate formed the final part of the talk. He showed an illustrative pie chart where the initial shareholders had a 25 percent holding. Those with intellectual property rights (IPR) and who took the financial investment risk held the rest. Venture capital looks for a high and swift return, he said, and the chair has a role balancing the non executive directors and advisors with executive of chief executive officer (CEO), to whom the chief financial officer (CFO), chief technology officer (CTO) and chief information officer (CIO) report.

Professor Jones, who has now become an academic, and who has moved with most of his research group to the University of Leeds from the University of Manchester, started by showing a simple, short chain aromatic molecule within an elliptical bipolar electron cloud. In aggregate the molecules - with all impurities absent - form crystals. Input energy, and they attain a phase -- liquid crystal -- between crystal and liquid. Apply force fields across appropriate thicknesses, and liquid crystals reorient themselves, giving colour contrast demonstrative of varied refractive indices.

In essence that is what is happening within a liquid crystal screen.

Fine if the field is viewed normally. That is, if one's line of sight to the screen is perpendicular to its plane. Viewing at an angle is less clear without more detailed force-field manipulation, which might be mediated at certain scales by, say, a field-effect transistor.

Industrial practise is in the patents, and Professor Jones, said the deputy vice-chancellor, has about 60. During Q&A I asked which of those patents in the nanoscale (distance, not time) were Professor Jones' favourites, but looking back I realise he side stepped the question.

Professor Jones put on the overheads the iconic equation describing first, second and third order response to forces on a bipolar molecule. Consider, for example, nitrogen triple bonded to carbon at one end of a short aromatic chain, balanced by an appropriate residue at the other end. Or make a molecule with polarity at right angles to a short aromatic chain.

Before reaching the corporate finish of his talk, Professor Jones gave a short history of important steps towards LCDs. The people and their work are what in his view link the underlying physics and chemistry (applicable also in biology) to a liquid crystal display on something like an iPad.

The key people he listed are: Edwin Land (polarizing film in the thirties); Jack Kilby (integrated circuits - 1958); Robert Noyce of Fairchild Computing and Intel (silicon, integrated circuits); Frank Wanless (CMOS - complementary metal-oxide semiconductor); Yoshiyuki Katsube (ITO - indium tin oxide - transparent conductor), Shizuko Katsube is named a co-author on a paper about tin oxide deposit by vacuum evaporation); George Gray (Room temperature liquid crystals. See **Liquid crystals**; Kobayashi Shunsuke (rubbed alignment); Peter Raynes (wide-temperature-range liquid crystal mixtures). Peter Raynes was in the audience yesterday.

While networking at University House after the talk conversation explored women in science and diversity issues, with the president of the Institute of Physics expressing some irritation at how few women are studying physics. □ HG

## REVIEW

## Move over, Brian Cox

A review by Helen Gavaghan, published online 4th April, 2016.

The Element in the room

A radioactive musical comedy about the death and life of Marie Curie

by John Hinton

Performed by John Hinton and Jo Eagle

Music by Jo Eagle and John Hinton

**THERE ARE TWO theories of acting**, John Hinton told me: inside out, and outside in.

I had asked John where he goes within himself when preparing to see the world through the eyes of the woman, Marie Curie, he is playing.

Time? 9pm - give or take - 3rd April, 2016. Place? Bar of The Square Chapel Centre for the Arts in Halifax. A post performance interview. There with a journalist friend from The Halifax Courier. Not intending, nor expecting, to flip into work mode, but then my alter ego - international science journalist - emerged.

The spark was quantum entanglement - a throw away comment from Hinton during staged audience participation. We had been playing pass the green ball of wool, while helium squeaked out its alpha decay, hydrogen vibrated and electrons beta decayed. I was Polonium.

Recalling the summer of 2005 when I interviewed Martin Rees in the Master's lodge at Trinity College Cambridge, I groped last night for my press card, business card, and my wallet to buy the play and music. In 2005 I had sat with one of Lord Ludlow's papers about baryogenesis on my knee, as I struggled to find a question the Astronomer Royal, and about to be President of The Royal Society, had not been asked before.

Same problem last night, only this time the interviewee was an actor. What could I explore which would not send him to sleep?

Hinton learned his trade at The University of Hull and the Ecole Internationale de Theatre Jacques Lecoq in Paris. That explained the intelligence in the script, and precision of the mime. In understated fashion, he drew out in acting Marie Curie's humanity, not burdening the audience, but leaving us aware of her dead husband, her triumphant Nobel prizes in physics and chemistry, her trip to the United States, the missed patents and her scientist daughter.

The play was within a commentary, which dropped discretely facts about Poland under Russian rule, and the perils of ignorance in commerce. All that glitters is not gold, nor is all management error corporate manslaughter - though it could be.

Hinton has two other touring biographical plays about scientists, they being Charles Darwin and Albert Einstein. Scientists he thinks of as revolutionary and inspiring. As an ensemble, Hinton envisages the trio as a triptych about biology, physics and chemistry.

I loved the energy in the performance, the jokes, the professionalism, and the engagement with their audience of this young husband and wife company. Hinton's deediness with his long skirts as he leapt energetically about the theatre was impressive.

Two other personal recollections sparked - a propos of nothing at all - by last night's show? Martin Rees pouring me a glass of apple juice during lunch in Cambridge a decade ago, and Tom Stoppard's Arcadia. The latter is the only other play I have bought on the night, inspired by the drama. On that occasion I was at The Juilliard in New York.

Hinton has in mind next to create a play that is an A to Z of science.

# Donkey riding.

A column in the from British Courts section of Science, People & Politics,

**Published online 1st May, 2016.** Their new electronic system was preoccupying the legal profession in Bradford when I returned to Court reporting after a winter catching up with my other work. Judges seemed proud to have learned new phrases, such as whether fields on their computer screens were populated, populating, would populate automatically, or would ever populate. Counsel assured judges they had uploaded papers. The recorder of Bradford was most courteous as he apologized for keeping Counsel waiting as he typed in whatever it was he had to type in to the new system.

Trial dates, committals for sentence, bail hearings - though I have still not clarified where the freedom of the press fits in with those - were time tabled meticulously. Indictments were reviewed. Charges severed. Charges joined. Arraignments queried, new arraignments took place.

Sometimes the Court was eager to move quickly to secure a batch of jurors as soon as possible on a Monday morning, other times more cautious.

Often before a trial starts the judge has a sentencing hearing on a completely different matter, during which prosecution and defence argue within sentencing guidelines for the justice they think appropriate.

It can be bewildering, because Counsel might in one case be defending, yet in another be the prosecutor. On one occasion defence and prosecution changed places to enable the defendant who was being sentenced to hear what the defence was saying. The defendant, who had a support social worker in Court, was taken in wheel chair to just beneath where the judge sits, so that judicial remarks could be heard by the defendant. Defence usually sits closest to the jury.

Counsel are those wearing wigs, white pointy collars and black robes. Solicitor advocates having rights in the Crown Court dress like Counsel, but minus the wig. Judges are more colourfully and variously attired.

Sometime judges announce themselves by banging on the door, their deliberate footsteps having been heard approaching. On those occasions the Court feels silent and portentous. Other times judges appear from nowhere, and all are left scrambling to their feet.

Peruse the lists in the Court, and one sees often one or two judges preside all day not over trials but over sentencing from previous trials, and preparation for trials yet to take place. There is a military precision to the process. Witness lists are reviewed, and these often reduce drastically in length by the time of the actual trial. Sometime interpreters must take oaths to faithfully interpret into languages as varied as Japanese, Vietnamese or Italian.

Though the public are allowed in the public gallery few do attend unless they have a specific interest in proceedings. Press - who include journalists for magazines, websites, TV and various outlets other than newspapers alone - in Bradford Crown Court sit opposite the jury, though it is not only we the press who sit in the "press box". On more than one occasion I have been the only one in there.

For trials the probation service tends to be absent, but they are present during much of the pleas and case management and committal for sentence portions of Court business. Ushers locate who is needed, and there is a witness service.

When not in a particular trial press are usually in the press room or other Courts. Security personnel scan those entering the building, search their bags, and patrol the public corridors. Uniformed and plain clothes police testifying in trials are present waiting to be called.

Among judicial tasks is ascertaining whether special measures are needed, such as screens or video links, where the witness might be distressed by seeing and being seen by the defendant. On those occasions press and others in the Court are usually asked to leave until the witness has been brought in through another entrance. They testify from behind a screen and are seen only by jury, judge, counsel and Court officers.

The formality and costume of the Crown Court match the occasion, in which a human being's good name and life are held in the balance. It is not, I contend, the wigs and gowns which cause fear, but the enormity and importance of what they represent, and what is actually happening. That fear cannot be taken away by taking off a wig. The wig can, even, be a child's friend. This is not daily life. This is carefully choreographed process, with intent at fair play to all. Here it is not enough simply to accuse or deny. **HG**

**NEWS ONLINE AT DATES SHOWN****FROM BRITISH COURTS, A SECTION IN SCIENCE PEOPLE & POLITICS****Adjournment to appoint new legal representative**

His Honour Judge Hatton QC, sitting in Bradford Crown Court, this morning granted Mohammed Rashid a three-week adjournment so that he could find legal representation to defend himself against charges of breaching a restraining order.

His honour and counsel had some discussion about solicitors and counsel, and explored whether one could approach a barrister directly. There was a view that one might need a barrister who had taken a special course giving direct access accreditation.

Judge Hatton said the trial would be going ahead on 22nd March, 2016. He thought a solicitor would quickly master the issues.

His honour told the defendant that between now and 22nd March the restraining orders remain in place.

Mr Niall Carlin is prosecuting the case for the Crown. Published online March 1st, 2016. HG.

**Not Guilty in Arson Reckless-Endangerment Case, with £24,200 Property Losses**

Earlier this afternoon a jury at Bradford Crown Court found Stephen Gibbs (23) from Leeds not guilty of arson, with intent to destroy property, and not guilty of being reckless as to whether the lives of others would "thereby be endangered".

The Court heard that the defendant, who had been heard to argue with his girlfriend, the tenant of the property, had been arrested within hours of emergency services being called. He was found in his father's loft with "soot" on his hands.

Mr Gibbs told the jury the "soot" came from old insulation in the loft.

Part of the prosecution case was that there was something dark on the defendant's hands when arrested. However, in summing up the defence said no forensic tests were performed.

Nothing in the case suggested that Mr Gibbs had been asked for, or had refused to supply, samples for forensic testing. It emerged during the trial that Mr Gibbs had voluntarily provided police with details they could check. Then, on the advice of his legal representative, Mr Gibbs returned no comment to many subsequent questions.

Property damage amounted to £24,200.

The trial judge was his honour Judge Benson. Mr Marcus Waite (correct) of Cousins Tyrer Solicitors in Leeds was the defence advocate. Published online March 4th, 2016. HG.

**Historic Sex Case**

Report of Bradford Crown Court on 7th March, 2016. Published online 05.50 8th March, 2016

YESTERDAY MORNING at Bradford Crown Court a 67-year old man admitted guilt to six charges of gross indecency with a child, and one of indecent assault. He collapsed distraught.

The offences described on the indictment occurred over a five-year period between 1977 and 1983.

Mr Dent, the prosecutor, said the Crown accepted the pleas, and requested that five other charges, which had not been put to the defendant, should lie on file.

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This was originally a Leeds-based case, and a retrial because a previous jury had, according to the judge, been unable to agree.

In the event yesterday no jury was sworn, and no evidence heard or tested.

Six of the counts on the indictment (as handed to me by the prosecution, carrying the Leeds, not Bradford Trial number) were of gross indecency with a child, contrary to section 1(1) of The Indecency with Children Act 1960. The seventh charge put to the defendant was of indecent assault of a male person contrary to section 15(1) of the Sexual Offences Act of 1956.

Judge Burn told the defendant that, depending on pre-sentence reports, there were reasons why, as the sentencing judge, he might be able to suspend the sentence. On leaving the dock to bail the defendant automatically, said the judge, went on the sex offenders register, for a period to be decided later.

Judge Burn admonished the defendant to comply with the probation service in preparation of the pre-sentence report.

Mr Michael Greenhalgh of Park Square Barristers appeared for the defence.

See:

Sexual Offences Act, 1956 Accessed 7th March, 2016

and

Indecency with Children Act, 1960 (As enacted)

Legislation.Gov also has a repealed version. Accessed 7th March, 2016 Story published online 8th March, 2016.

**Defrauding an employer**

"You are a 59-year-old man with a troubling history of dishonesty in the workplace," said His Honour Judge Roger Thomas QC to Riccardo Sorice this morning. His honour then gave a 5-year prison sentence to Mr Sorice. The tariff arrived at was after a discount for making a plea during proceedings.

Mr Sorice was convicted of charges under sections 1 and 4 of The Fraud Act of 2006, and had benefitted by £652,382.18p.

The offences took place between 25th February, 2008 and 1st February, 2015.

However, during part of 2008 Mr Sorice was, in fact, in prison. At the time Mr Sorice's employers - Pro Audio Systems Ltd of Bradford - thought that in 2008 Mr Sorice was in Italy attending to a family emergency. The company had granted Mr Sorice leave on compassionate grounds. To give credence to his deception Mr Sorice, said the judge, had arranged for a letter to be sent from Italy

Pro Audio Systems Ltd is a private limited company, incorporated on 12th May, 1988. It was known between 12th May 1988 and 14th December, 1988 as NEXTWORD Ltd (Source Companies House).

Ms Alisha Kay was Counsel for the Crown Prosecution Service.

I would like to thank the Leeds-based Crown Prosecution Service for telling me that Ms Kay spells her name with an "e" on the end. I had been unable to find her in the Sweet and Maxwell directory of barristers. Helen Gaghan. Bradford, 13.50, 17th March, 2016.

**Custody extension**

Yesterday his honour Judge Durham Hall QC agreed to the Crown's request to extend custody for Mr Dean Ash, who is facing charges of importation of cocaine and MDMA.

Mr Ash is alleged to be in contravention of sections of:

The Misuse of Drugs Act 1971;

The Customs and Excise Management Act 1979; and

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The Criminal Law Act 1977

The case was a transfer from Leeds Crown Court.

During legal discussion the defendant, a white man, who is clearly adult and mature, was composed. He had long black hair tied back neatly, and upright posture. At one point his counsel conferred with him.

His honour said that the conduct of Leeds Crown Court had - as one would expect of his honour Judge Peter Collier QC, the recorder of Leeds -- been impeccable. Published online 18th March, 2016. HG.

### **Fracas in Halifax: not guilty verdict**

A jury in Bradford Crown Court returned a unanimous not guilty verdict this afternoon of charges that Mr Wayne Beverley (34), a self employed builder, inflicted grievous bodily harm in the early hours of 1st March, 2015 on Mr Kingsley O'Shea, then aged 19.

The Court heard that there had been a fracas because Mr O'Shea heard a woman calling for help in a dark, cobbled, narrow alley near to Commercial Street in Halifax. Mr O'Shea saw a man bending over the woman who was screaming for help and ran, as he thought, to her assistance. It later transpired that the screaming woman was the girl friend of Mr Beverley and that the two had had a row.

During a confused melee there was physical contact between the defendant, Mr Beverley, and the complainant, Mr O' Shea. The complainant and defendant were not known to one another. All testifying witnesses to the event (Mr O'Shea, Mr Beverley and a friend of Mr O'Shea's) agreed that each for different celebratory or recreational reasons had had - unusually - a not insignificant amount of alcohol.

Each testifying witness to events agreed that the woman, Mr Beverley's girl friend, was screaming and asking for help.

At one stage Mr Beverley was trying to help his girlfriend to her feet. Of the central Halifax location where they were he said, "I know what that doorway is like, with people urinating and being sick in it. I knew it was somewhere she didn't want to be sitting."

The complainant described to the jury how he experienced the physical contact between himself and the defendant, Mr Beverley. Mr Beverley recounted what he experienced. There was some overlap in accounts. Mr O'Shea's friend additionally said he had seen a "kicking toward" motion by Mr Beverley, but that it was dark, and he had had something to drink. When asked how much, on a scale of 1 to 10, he had been impaired by alcohol, Mr O Shea's friend told the jury somewhere between 6 and 7. Later during his summing up the judge disparaged such subjective assessments of how alcohol affects one.

In summing up his honour clarified that at sometime between 3am and 10pm on the 1st March 2015 Mr O'Shea sustained a fibula fracture. Mr O'Shea had described how, shortly after the fracas, he was in considerable pain and had had to sit down, but had not realised there was a fracture. He and his "mate" had shortly after the fracas taken a taxi back to Mr O' Shea's home. Later in the morning and that night Mr O' Shea's ankle was badly swollen, according to witnesses, and by 10pm Mr O'Shea decided to go to Accident & Emergency at Calderdale Royal Infirmary.

Mr O'Shea made his complaint to police a few days after the event, and told the Court he had been trying to prioritise things in his head, which is why he had not gone earlier.

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Dr Jennifer Bolton, a Fellow of the Royal College of Pathology, testified that she had seen the X-ray of the fractured fibula, and she described ways in which the fibula can be damaged. The injury can be ancillary to a tibia fracture, she said, or to the fibula only. Her specialty, she said, is forensic pathology, and from study of the dead it is possible to transfer knowledge to understanding injuries in the living.

Dr Bolton leaned in interpretation to the fracture having been caused by a downward stamp, but agreed that, if one was unlucky, forces of comparable strength to cause a fibula fracture could be generated by twisting one's ankle as one fell.

In response to a specific question from the judge Mr O'Shea said he had experienced nothing after the fracas which could have caused the fracture. Both Mr O'Shea and his friend told the jury that during the fracas Mr O'Shea had hit the ground.

The defendant said he had not seen Mr O'Shea on the ground, but that that was probably because he, Mr Beverley, was preoccupied with his girlfriend's welfare.

When in June 2015 police arrested Mr Beverley he was asked during interview if he could have caused the injury to Mr O'Shea. He answered, "Possibly, as he (Mr O'Shea) fell to the ground --- I wasn't attacking."

The Detective Constable in charge of the case told the Court that the top Mr Beverley had been wearing at the time had been recovered, and had had no blood on it.

In addressing the jury Mr Christopher Haddock, solicitor advocate for the defence, said, "The defendant is a person of good character, if he is to loose that today it is best if he is condemned by a jury of his peers, not by police and lawyers."

Once the jury returned their not guilty verdict his honour told the defendant he was discharged.

After the case Mr Beverley's girlfriend of the time, who was in Court in the public gallery yesterday for the first day of the trial and for some of today, told me that she is still Mr Beverley's girlfriend. A tall and pleasantly spoken young woman, she was with Mr Beverley outside Court as he waited for the jury to return with their verdict.

Miss Abigail Langford prosecuted on behalf of the Crown. She had in her opening told the jury that at the end of the trial their papers and notes would be destroyed. The jury deliberated between 2pm and 3.40 pm.

Addition a few minutes after publication: the trial judge was His Honour Judge Hatton QC. Publication at approximately 22.05. 23rd March 2016.

**Sting: Judicial sentencing remarks of general nature**

His Honour Judge Roger Thomas QC, the recorder of Bradford, yesterday (5th April, 2016) drew attention in open court for a second time to the existence of his public remarks on sentencing in relationship to a Halifax-based undercover police operation in 2015. Known as Operation Lineland, the sting was aimed at identifying those supplying class A drugs in Halifax.

Judge Thomas's written remarks make clear the police were responding to local pressure. He writes that community impact statements will be taken into account, that sentencing is on a case-by-case basis, and in line with sentencing council guidelines.

In his written remarks Judge Thomas points out also that sentencing guideline are not "set in stone".  
**Stories in this section are published online as news as they happen, and have happened in the quarter prior to publication. HG. Editor.**

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