

Science, People & Politics

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ASKS

Should novel insights from the science behind advances in patent art be cited in the bibliographies of peer-reviewed scientific literature?

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COMMENT: In favour of citing patents in the scientific literature.

An argument by Helen Gavaghan, editor of *Science, People & Politics*.

Why should my opinion have professional validity in a debate - which I would like to start - about including the citation of patents in bibliographies of the scientific literature?

The question and its answer are prompted by the news feature in this issue about the decision of the Patent Court of England and Wales concerning the validity of claims in a patent for a ceric oxide, and catalyst for exhaust-cleaning. The patent is now approaching the end of its life, but two separate billion-dollar groups each with global sway have via constituent corporate members locked horns about claims in the patent. The winner has been declared (see page 5).

To answer the question at the beginning of this comment I need to make this commentary in part "about me". My aim is to make myself bait for intellectual debate.

My particular 40-year journey of professional experience began in 1976. That was when, having of course gained the necessary "A", levels I started my degree in biophysics at the University of Leeds. I still recall the awe I felt walking up Woodhouse Lane toward The Parkinson Building. I had convinced a University admission's tutor I was competent to absorb, synthesize and analytically apply and build on four years of degree-level study in math, physics and chemistry, and to place those all in the service of biophysics. At Leeds biophysics was about determining the three-dimensional structure of biological macromolecules, and their structure function relationships in a physiological whole, given the new genetics. Three years in to the degree I became secretary of the student biophysics' society, and then president in my final year. I had the honour of introducing scientists visiting from around the country who gave evening presentations to our student society. We hosted scientist of considerable competence who staff had proposed to us. Often staff also attended these talks. I suspect this will be experience recognisable to some of my readers; and that it is enough to convince them I must indeed have read scientific literature in support of my degree. My *viva* before my graduation in 1980 was conducted by a true giant (Phillips D.C.) in our field, who was a former colleague of our head of department, Professor A.C.T.North. Only a few years ago I had the pleasure of telling Mrs North how much we students had enjoyed her summer garden party.

Fast forward 40 years to the meeting of the British Science Association in Manchester where I heard Venki Ramakrishnan speak of determining the structure of ribosomes, working at angstrom-resolutions unimaginable then. I prepared for the Nobel-laureate's talk by dissecting science papers. My appreciation of Ramakrishnan was made possible by my four years as trainee scientist at Leeds, and by my subsequent professional life.

In the introduction to a science paper each sentence can stand alone. What links them to each other is the facts and epistemology in the referenced bibliography. Look at the title of the referenced Paper, at its year of publication, and at the journal in which it was published. Those with postgrad experience in, say, scripture will know that what St Paul wrote for one group was honed to that group's culture and knowledge sets. Ramakrishnan's stunning work has dandelion roots deep into well fertilized beds of knowledge, each with its own culture and history. I think Ramakrishnan's

Comment continued from page 3

synthesizing ability is what made him such a good choice to be President of the Royal Society.

From my own postgrad research and independent scholarship in the history of science I know Ramakrishnan will have isolated each fact, evaluated its basis and construction, assessed that construction against tests of plausibility given the knowledge sets of science. In other words, the bibliography of top-quality research is a defensible choice. I know this also from experience. In my case from my own first book, which I researched and wrote with a grant from the New York-based Alfred P Sloan Foundation. My second book was the first official history of the IGO responsible in Europe for operational data collection and assessment in the field of meteorology. That work is critical to the two arguably most important issues of our day: climate change and extreme weather events. That second work takes place within a multi- multi- billion-dollar world where patents matter (as they also mattered for commercial topics in my first book). In that world gross domestic Products (GDPs), the concepts of which I also had to grapple with and which formed part of the history, drive contract awards. In other words patents matter in the world of the operational.

My point is I have engaged deeply with the scientific literature. From 1976 to 1980 proudly and with shyness donning my white lab coat I began battling at the frontiers of knowledge. I was armed with fume cupboards, scalpels, soldering irons (for circuit boards or amplifiers), with centrifuges, microscopes (optical and electron), computers, X-ray diffraction, solutions and potions. I noted data, drew graphs, calculated and worked out standard deviations, fiddled to seal glassware connections. I drew sustenance from discussions, introductions, methods and conclusions in science papers. Tucked deep in the Edward Boyle library, truth to tell I sometimes floundered. Now I dissect bibliographies with alacrity. I saw then and see now no references to patents.

After graduation I worked initially for the technical press. It soon became clear the task needed solid grounding in the sort of journalism which underpins the Crown Court reporting I sometimes undertake now, and the other legal reporting I have done elsewhere. In my three years' journalism "apprenticeship" - with in-house and external formal training, I encountered many industrial production processes which must have been underpinned by patents. Those patents were invisible to me. If knowledge gleaned from working patents guides hypothesis development in the science literature, that fact was not made public in the literature. (As an aside I assume readers know that it is in the scientific literature that scientists build new knowledge?)

I travelled from trainee scientist at one of the UK's leading Universities via a three-year journalism apprenticeship in the technical press to become an editor and journalist for *New Scientist*, which in those days also had strong political and policy interests. For three and a half of my seven years on staff at *New Scientist* I was technology news editor. During that time I ran the monthly patents' page, contributed by Barry Fox. I quizzed the former patent attorney (who might still have been a patent attorney or examiner - the point is he was an expert in patents) on every item he filed with me. On the rare occasions I did not understand the story, I did not publish the item. Recall I had acquired a hands-on knowledge of how the circuit does not work if my technique did not manage heat flow in solder just so, or the crystal did not grow if the solution was not just so etc...

That hands on knowledge is not easily passed on in experimental write ups. During my four years at Leeds I had developed a pretty good practical (not the same thing as experimental) and theoretical understanding of making things work, as well as an understanding of why they do and do not or might not work. It was not always clear to me whether the unknown was my particular ignorance, or unknowns in the field. That is typical of life at the frontier of new knowledge. In the gap between what should happen and what did happen I learned technique. That is knowledge akin to what a patent contains. The test of a patent is does what is claimed work? When the claim works there is potential for money (and for shareholders, and the pension funds, and the law suits!).

Let me return to the University of Leeds. Our write ups followed the canonical form of introduction, method, results, conclusions and discussion. The introduction is the bit where one explains to the reader the thinking behind the experiment, and why one is testing the hypothesis being examined. Next comes the methodology. Successful methodology and a patent working are two different things. In a scientific paper the purpose of the methodology is to show in practise the specific underlying science explored in the hypothesis being tested. The protocol selected in methodology focuses experiment tightly on the experimenter's specific questions. Out with the extraneous!

For the patent the issue is, 'does the claim work?'; for the scientific paper the issue is 'has the experimenter correctly isolated, framed and executed the experiment, such that it can be reproduced, and the knowledge claims substantiated or challenged'? Is the citation in support of each fact in the whole paper strong enough to do the job it is being called on to do? Patents and the scientific literature view knowledge creation through two different prisms. Yet both patents and "the scientific literature" draw on the same selection of agreed science paradigms.

We know from Thomas Kuhn's persuasive work (persuasive in my opinion) that an accumulation of unexplainable discrepancies in experimental findings often precedes the paradigm changing. Personally I think there are precious few paradigm shifts, and that mostly new, not replacement knowledge, is explored because developments in theory and experimental equipment open new frontiers at ever larger or smaller scales of size, wavelength, frequency and luminous intensity.

It is the commonality of a paradigm which makes me think citing patents, with explanation and in relation to the common paradigm, in scientific papers would: improve knowledge building, enhance patent quality, tighten and strengthen patent claims, and ground scientific research and ethics in day to day life. Perhaps there are benefits in such a course of action also for commerce and international relations? That, I think, will demand further comment in this magazine in 2019.

For now, have I convinced you to engage with me in debating this ideas? To talk among yourselves to determine the pros and cons and implications of my proposal?

Though we are not a peer-reviewed journal if you have experience of scientific research and of patenting new ideas for commercial exploitation please write to us at:

The Editor, *Science, People & Politics*, 165 Longfellow Court, Mytholmroyd, HX7 5LG, UK.

We have expertise which could expertly evaluate your ideas for non-peer reviewed publication. At no financial cost to you! Or email me, the editor, at hmt.gavaghan@gmail.com. **HG**.

Patent art leveraging science

SOMETIMES PATENTS EXPLORE PLACES SCIENCE CANNOT YET FULLY EXPLAIN. BUT THEN SO ALSO DOES TRADITIONAL PEER-REVIEWED SCIENCE. THROUGH EXPLORATION OF THE SCIENCE OF THE RELEVANT PATENT ART AND THE LEGAL ASSESSMENT ABOUT WHICH EXPERT'S VIEW WAS BEST SUITED TO THE MATTER IN DISPUTE A JUDGEMENT FROM THE PATENT COURT OF ENGLAND AND WALES THIS QUARTER DEMONSTRATES HOW - THROUGH PATENTS – NEW KNOWLEDGE IS BROUGHT IN TO THE PUBLIC DOMAIN.

News feature and analysis by Helen Gavaghan**

On 23 April 2018 Mr Roger Wyand QC, sitting as a deputy high court judge of the Patents Court in England and Wales, found in favour of two claimants who are members of the global Solvay group in a dispute related to exhaust purification. Claims in the Solvay patent, “Ceric Oxide and method for production thereof, and catalyst for exhaust gas clarification” were upheld. The judge found against allegations of “insufficiency” by the infringers of the patent (Molycorp Chemicals & Oxides (Europe) Ltd, ruled the patent does include an inventive step, and said amendments to the patent were unnecessary. The defendant’s product, concluded the judge, infringed the five claims which were in contention in the legal action. The patent was filed on 5 September, 2002. European patents are granted for a maximum of 20 years from date of filing. The defendant at date of the judgement was called Neo Chemicals and Oxides (Europe) Ltd (not Molycorp etc...).

Central to the judge’s decision making was his determination of which profile presented to him would represent an individual skilled in the art of the time. The claimants’ and defendant’s experts gave the judge differing views. The choice matters because under the European Patent Convention patents are granted only if the invention is new, involves an inventive step, and is industrially applicable. The invention, says the Convention, must not have been known to the public in any form, must not be obvious to anyone skilled in the Art, and must be capable of being manufactured or used industrially.

This litigation started on 13 April 2016 when the Solvay group member (Rhodia) with a licence for the patent alleged that Neo had infringed Rhodia’s patent rights in the UK and Germany. The patent itself is owned by the first claimant, which is now known as Solvay Special Chem Japan, Ltd. When the litigation began the patent owner was known as Anan Kasei Co. Ltd.

The rare earth element Cerium, what is known as a lanthanide, is at the centre of the legal wrangle, though the science of the element was not under legal investigation. Had Cerium been called

1) Judgement: 23 April, 2018. <http://www.bailii.org/ew/cases/EWHC/Patents/2018/843.html>

The disputed patent: Ceric oxide and method for production thereof, and catalyst for exhaust gas clarification. Date of filing 05.09.2002. <https://patents.google.com/patent/EP1435338B1>

Useful website: The European Patent Office. <https://www.epo.org/index.html> and a glossary from the EPO <https://www.epo.org/service-support/glossary.html#Content>

PUBLISHED 31 December, 2018 (delayed because of business and publishing related matters).

to the stand to explain the behaviour of its “business end”, namely its outer electrons and their locations in what chemists call orbitals the element might have been hard pressed to give answers which the questioners understood. There is a place where science sees there is an unknown, yet technology has found a way to make something work, either because of/or in despite of the unknown. That is the “space” occupied by what patent experts call the “state of the art”.

What makes ceric oxide an attractive material is its ability based on its valency electrons to be both oxidant and reductant in different atmospheric conditions. That is, ceric oxide can chemically help reactions converting noxious exhaust fumes such as carbon monoxide or nitrogen oxides into less harmful engine exhaust. Key to an effective facilitation (catalysis) of exhaust gas purification is the ceric oxide’s surface area, pore size at the surface, and conditions under which the ceric oxide operates, either alone, or in a combination with elements such as zirconium as an oxide.

Inclusion of zirconium in the invention became a moot point, and legal argument looked at the phrase in the patent “which is a ceric oxide consisting ‘essentially’ of ceric oxide”. This second phase in the litigation began on 21 July 2016 when Neo lost in regard of infringement of German rights, and counterclaimed alleging claims one and three to five of the patent were invalid. Claims 6 to 8 giving a method of making a ceric oxide defined in claim one were not challenged. More than once during the counterclaim proceedings Neo altered the basis of its allegation of invalidity.

The claims Neo challenged relate to Cerium in an oxide form, in which it had a particular surface area after a particular production method. Patent claims three to five narrow down a specification for that surface, and assign physical characteristics which are demonstrated by such things as behaviour during a controlled temperature reduction. The aim, of course, is a ceric oxide which effectively cleans exhaust fumes emitted at a range of temperatures.

These claims for a ceric oxide on the basis of production method and characteristics in relationship to the specific outcomes of surface areas and their physio-chemical characteristics are where patent “Art” meets science. Experts gave evidence as to the state-of-the art of a skilled person at the time. Priority date of the patent is 7 September, 2001, a year before the patent was filed. Who would such a skilled person be? The judge decided. In order to make the decision the first paragraph of the patent [paragraph 0001] was discussed at some length. In paragraph 0001 the invention is described as relating to a ceric oxide with excellent heat resistance, meaning that the surface would not fuse or crumble at high temperatures. Such fusion of the surface at high temperature, known as sintering, would reduce the ceric oxides’ surface area for oxygen storage, which is needed for purifying the noxious elements in exhaust gases.

By giving a specific example of use of the patent as being that of a ceric oxide being suitable for purifying vehicle exhausts it was clear, argued the claimant’s expert, that the person skilled in the art of the time needed specific expertise in the oxygen-carrying capacity of high-temperature, high surface area ceric oxides rather than knowledge of ceric oxides in general. Given that ceric oxide surface area is measured in m^2/g a point here is that for a high surface area the surface will be thin. Both experts fielded at trial to give evidence as to what profile would best describe a person skilled in the art of the time were high-flying academics with impressive credentials. Both thought

an individual skilled in the art of the time would be a graduate chemist with professional industrial experience. The judge was more convinced by the claimant's expert as to the literature the person skilled in the art would have been reading at the time. Then the judge identified in his judgement the common knowledge of the time which was relevant to the patent being litigated.

At trial the defendant's expert gave responses which, as it happens, proved helpful to the claimant's case. The defendant's expert was asked if the characteristics claimed in the patent would have been of considerable interest at the time to a person skilled in the art at the priority date. He told the Court, "yes". Asked if that interest would have been because the skilled person of the time would not have known how to make a ceric oxide by the method described such that it retained a high surface area having experienced high temperatures, and not having an additive, the defendant's expert said, "At the time, probably, yes." Then the defendant's expert told the Court in response to questioning that the patent was a significant contribution to the art.

There was a dispute between the experts at trial as to whether the process described by the patent was hydrothermal or not. At this point the experts were dealing with pure science, even though that is not clear from the trial extracts and dispute context presented in the judgement.

Much of the judgement inevitably focuses on the legal grounds behind Neo's counterclaims of invalidity. One ground of invalidity advanced was obviousness. The judge's approach was: identify the inventive concept in the claim or the claim as construed; identify the difference between the state of the art of the time and the inventive step in the claim; ask if viewed without knowledge of the alleged invention whether the differences would have been steps obvious to a person skilled in the art of the time.

As for the phrase "consisting essentially of" which is used in claim one of the patent the judge pointed out that law had previously decided other unnamed components were permissible if the additional component does not materially alter the essential characteristics of the component mandatory to the patent. Neo lost on all grounds.

BACKGROUND READING SELECTED BY THE EDITOR, AND REFERENCES FOR THE NEWS FEATURE.

URLS ACCESSED 28.12.2018 AND 29.12.2018. ITEMS RESEARCHED AND SELECTED BY HELEN GAVAGHAN.

EDITOR'S COMMENT: BET WHICH IS AN ACRONYM BUILT FROM THE FIRST LETTER OF THE NAME OF THE SCIENTISTS WHO DEVELOPED THE METHOD IS ONE OF THE APPROACHES TAKEN TO MEASURING SURFACE AREA. IN APPLICATIONS SUCH AS CLEANING UP THE NOXIOUS ELEMENTS IN EXHAUST FUMES THE RELATIONSHIP OF THE SURFACE AT WHICH OXIDATION AND REDUCTION REACTIONS CAN MAKE THE NOXIOUS PALATABLE IS IMPORTANT. BET IS ONE METHOD ONLY OF CALCULATING SURFACE AREA. A NUMBER OF SCIENTIFIC AND TECHNICAL/OPERATIONAL ISSUES REMAIN UNSOLVED. WHAT HOLDS SURFACE TENSION, WHAT DRIVES CAPILLARY ACTION, WHERE ARE THE FRICTIONS, WHAT IS THE LATTICE STRUCTURE, HOW ARE LAYERS LAID ON SURFACES, HOW DOES ALL THIS RELATE TO VALENCIES AND WHAT DRIVES VALENCIES? SO IF YOU JUST FANCY FOLLOWING THE HISTORY OF SCIENCE IN DEVELOPMENTS RELATED TO SUCH ISSUES YOU MIGHT FIND IT SATISFYING AND PROVOCATIVE TO PLOUGH THROUGH THE READING LIST BELOW. HG.

Adsorption of gases in multimolecular layers by Stephen Brunauer, P.H. Emmett and Edward Teller [February 1938.]

<https://pubs.acs.org/doi/abs/10.1021/ja01269a023?journalCode=jacsat> Early thinking about surface adsorption.

The BET method theory and practice. [May 1973.] <https://link.springer.com/article/10.1007/BF02479039>

BET method of measuring surface area. [citations 2000 to 2014.]

<https://www.sciencedirect.com/topics/chemistry/bet-method>

BET methodology and background.

<https://apps.dtic.mil/dtic/tr/fulltext/u2/1017934.pdf>

[September 2016]

FROM BRITISH AND INTERNATIONAL COURTS

Murder

Names removed from the news report which was published first on 25/5/2018 on gavaghcommunications dot com. My intent is to present hard news such that scientists and politicians internationally can assess for themselves what might be done to make our world a better place.

The jury retired at 1pm this afternoon. By 2.10pm we learned there was a verdict. Unanimously the jury decided _____ had murdered his wife, _____. Victim impact statements read to the Court before sentence was passed testify to three children who are beyond bewildered at the shattering of their world in November last year.

The judge, his honour Judge David Hatton QC, said he would pass straight to sentencing, but before doing so his honour rose, leaving press, police, public, counsel and jury scrambling to their feet before he stopped, told the jury they might leave, and that he would pass sentence at 3pm. Judge Hatton did so. With the jury back as witnesses his honour told the defendant the sentence was being passed as the law required for murder. The defendant was handed a life sentence and told he must serve 24 years in prison (less 180 days) before he may approach the Parole Board to apply for early release.

The killing of the victim was brutal. Only nine days before the killing neighbours had called police because of noise from the marital home. The victim had declined to give a statement, so police had released the defendant. The Court heard of marital discord and distress, with the children caught in the crossfire. In reaching their verdict the jury rejected the defendant's defence of "self defence and loss of control". The defendant told the Court that after his wife was dead he had tried to kill himself. Repeatedly he told the jury he had lost control and could not recall details. Prosecution and defence each presented different accounts of how the knife which caused the victim's death came to be in the defendant's hands.

The prosecution case was that after the murder the defendant had faked loss of consciousness and he had made an opportunity for unwitnessed murder. The defendant had scored various marks on the Glasgow Coma scale for loss of consciousness when assessed by paramedics on the day of Monica's death. In directions to the jury his honour made clear the circumstances in which a partial defence of loss of self control may be offered such that it would reduce a murder charge to one of manslaughter.

During testimony the Court heard how the defendant was taken from the scene to Leeds' General Infirmary where he was treated for two days. After sentencing the defendant, who slumped with his head in his hands when he heard the verdict, the judge thanked the family of the victim and defendant for their dignity in Court. Those members of the public who attended the home of _____ on the day of the murder were thanked for their exemplary conduct, as were the first officers on the scene: SPECIFICS REMOVED.

Finally, the judge told the jury of the value of their service.

Parole board of England and Wales not fit for purpose, says its former chair

Helen Gavaghan, 10th May at the University of Leeds

"My concern is what is not said in the review of the Parole Board of England and Wales which was published 28 April, 2018," Nick Hardwick told an audience last night at the University of Leeds. The review was ordered by David Gauke, Secretary of State for Justice, following the public outcry surrounding parole board decision-making in the case of the convicted sex offender John Worboys.

Professor Hardwick was giving the Frank Dawtry Memorial lecture*. Former guest lecturers have included Jack Straw.

Hardwick resigned from the Parole Board in March this year in the wake of the John Worboys controversy. Though chair of the Board at the time of the unpopular decision, and willing to take responsibility, Professor Hardwick was not himself on the panel which made the controversial recommendation.

Hardwick, like the Secretary of State, thinks there should be greater transparency in Parole Board decision-making. He said the victims in the Worboys case had behaved with courage, determination and grace. Yet Hardwick did not shy away from the reality that the Parole Board's role is not to sentence, and not to sentence for untried crimes. Decisions should not be shirked because they are unpopular or do not suit the Secretary of State for Justice, he said.

Likening some Parole Board hearings to being in a Committee, where the "committee" does not always get to the truth, Hardwick called for a more adversarial process. In Q and A afterwards one parole board member raised a cautionary note in this regard, saying that a less confrontational situation can sometimes elicit best evidence from a witness.

Hardwick told his audience that the Parole Board System of England and Wales clearly needs modernising. He thinks the reform proposals published on 28 April do not go far enough. Though clearly aware of prisoners' rights and that some victims are themselves offenders, and that there are legitimate grounds for privacy in some matters, such as medical, Hardwick's view was the system should be much more open.

In what would be a bold departure from the historic role of Parole Boards Hardwick told his audience that Board members should have the same independence and security of tenure as that of a judge or a magistrate, and with powers to enforce the attendance of witnesses.

During the same lecture Hardwick, who is also a former chief inspector of prisons (HMIP), slammed the state of prisons in England and Wales. He blamed failure to accomplish prison reform on the low status in the ministerial pecking order which the minister for Justice has.

Citing recidivist figures just short of 50 percent, and showing a photograph of bunk beds for two men in what he called a toilet, Hardwick said prison reform in England was a political and policy failing. "The picture (he showed of two bunk beds in little more than a closet with a toilet) doesn't give a sense of the stink from a toilet where two men defecate and urinate all day," said Hardwick, adding there might be merit in the Prison Governors' Association call for a public inquiry.

Hardwick's message was twofold: transformational change is needed of the parole board system of England and Wales, and a mechanism resilient to political change needs to be in place if prison reform is to be effective.

FURTHER READING URLS ACCESSED 10-05-2018

Professor Nick Hardwick, School of Law, Royal Holloway, University of London.

<https://www.royalholloway.ac.uk/criminologyandsociology/news/newsarticles/nick-hardwick-joins-the-school-of-law.aspx>

*Frank Dawtry: Background to the annual lecture.

<http://www.law.leeds.ac.uk/events/2009/ccjs-frank-dawtry-memorial-lecture>

1. Between: THE QUEEN on the application of (1) DSD and NBV (2) MAYOR OF LONDON (3) NEWS GROUP NEWSPAPERS LTD

Claimants or Interested Parties and

(1) THE PAROLE BOARD OF ENGLAND AND WALES

(2) THE SECRETARY OF STATE FOR JUSTICE

JOHN RADFORD (formerly known as JOHN WORBOYS) (Interested Party)

<https://www.judiciary.gov.uk/wp-content/uploads/2018/03/dsd-nbv-v-parole-board-and-ors-summary.pdf>

2. Safety in Custody Figures, published 26 April, 2018. Quarter to the end of December, 2017.

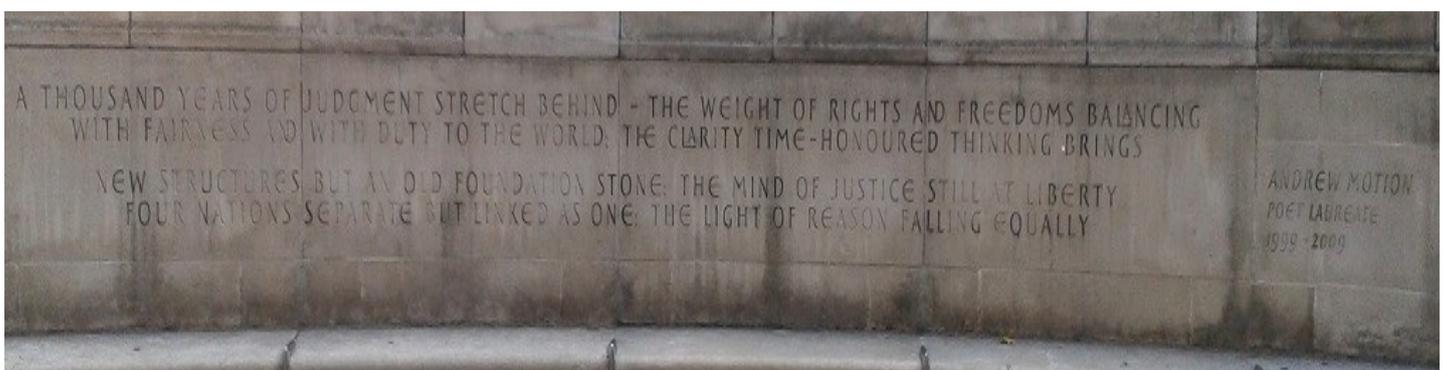
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/702635/safety-in-custody-q4-2017.pdf

3. 28 April, 2018. Review of the law, policy and procedures relating to parole board decisions.

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/703534/review-of-the-law_policy-and-procedure-relating-to-parole-board-decisions.pdf

Caption. Words carved in to the stone bench outside the Supreme Court of the UK.

Pic credit: Helen Gavaghan© 2018



QUIZ

1. Is single-molecule tracking microscopy a real or imagined technique?
2. What is DESY an acronym for, and what is the English translation?
3. Who coined the phrase fractal?
4. Name one country in which rare earth elements are found.
5. What did Dmitry Mendeleev propose.
6. What is ECMWF an acronym for.
7. In which year did Mendeleev make the proposal for which he is famous?
8. What are Sheldon Glashow, Abdus Salam and Steven Weinberg famous for?
9. Where is the Mongolian University of Science and Technology based?
10. Who is the president of Turkey?

Answers are to be below.

DON'T CHEAT!

ANSWERS TO THE QUIZ ABOVE

1. Real.
2. Deutsches Elektronen-Synchrotron laboratory in Germany.
3. Benoit Mandelbrot.
4. India [see <https://www.energy.gov/maps/estimated-rare-earth-reserves-and-deposits>].
5. A formulation for arranging elements – which became a basis for today's periodic table.
6. European Centre for Medium-range weather forecast.
7. 1869 [<http://www.rsc.org/periodic-table/history/about>].
8. Development of the unified electroweak theory.
9. Ulaan Baator.
10. Recep Tayyip Erdoğan

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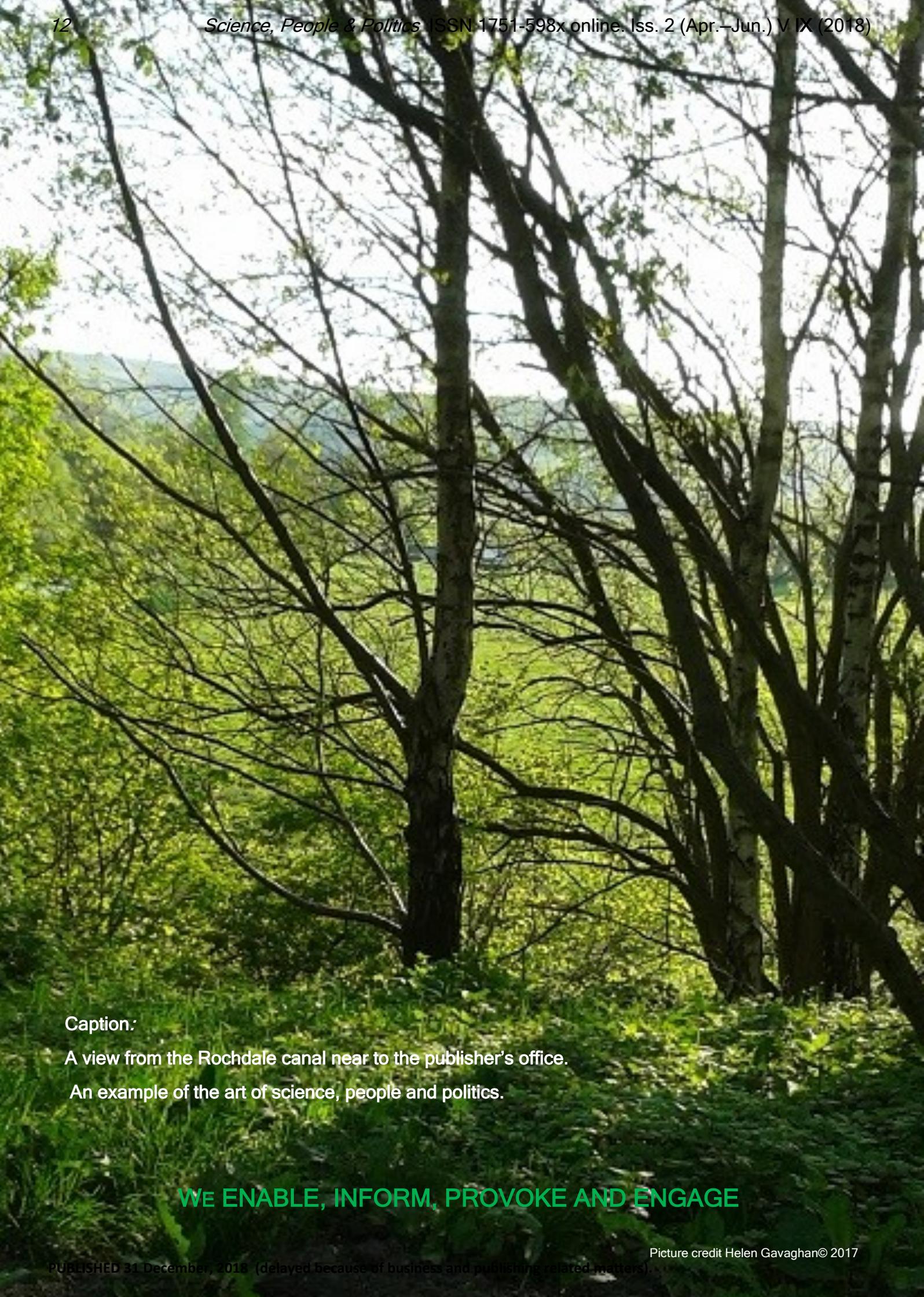
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Supplemental issues released intermittently between quarterly publication

Why do we include a section about reports from Courts?

Why does this magazine include a section giving reports from British and international Courts? We are a humanities' title. Few things are more human than those events emerging from Courts, be the Court criminal or civil. The magazine's output is intended for primarily for scientists and politicians with an international outlook. What emerges from Courts is often of professional relevance or significance to both groups. Each have skills and knowledge sets and networks which can address and perhaps solve the causes of crime, or remove the causes of civil dispute. Sometimes science and politics make matters worse without intent, sometimes with intent they make matters better. From a position of scientific literacy, belief in the democratic process and in a rule of law which is fair, just and equal for all, the stakeholders who have created and are developing *Science, People & Politics* invite our readers to apply their skill and expertise to solving problems revealed by what we report from British and International Courts of Law.



Caption:

A view from the Rochdale canal near to the publisher's office.

An example of the art of science, people and politics.

WE ENABLE, INFORM, PROVOKE AND ENGAGE