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Historical Group

NEWSLETTER and SUMMARY OF PAPERS

Editor: Dr Anna Simmons

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The life and death of John Masson Gulland FRS (1898-1947) – John Nicholson	

barriers faced and how their pioneering efforts can be uncovered.

Programme

10.15 Registration and coffee

10.55 Welcome and Introduction - Peter Morris.

First Session – Chair: John Hudson

11.00 Anne Barrett, Imperial College, London:

How Archives Can Reveal Hidden Women in Chemistry

11.35 Presentation of Wheeler Award to Sally Horrocks – Peter Morris.

11.45 Sally Horrocks, University of Leicester:

From the coming into force of the Metropolis Management Act 1855 to the year 1939 there was a “great renaming” of thousands of London streets so as to avoid duplication that had been inconvenient for postal deliveries. For instance, sixty “George Streets” were renamed; and sometimes, a distinctive street name was extended to an adjacent block so that the numbering had to be changed even in the part of the street originally bearing that distinctive name. These processes are illustrated with respect to (i) the famous “Broad Street Pump” of Dr Snow’s epidemiological research on cholera transmission (location now “ ”), and (ii) Michael Faraday’s place of apprenticeship in Bladford Street (renumbered from “2” to “8”). Researchers are advised on the resources available to overcome the problems created and a summary of the general development of London from 1855 to 1965 is given.

Michael Jewess, two related articles “Snippets from the Archives: A Look back at the Federation’s Fiftieth Anniversary”, *IP Federation Review*, December 2020, 6-9 and “IP Federation A

SOCIETY NEWS

Division of the History of Chemistry of the American Chemical Society (HIST)

The Division of the History of Chemistry of the American Chemical Society (HIST) is 100 years old in 2022. For this anniversary year, it has prepared an extra issue of the *Bulletin for the History of Chemistry*, available open access and edited by Carmen Giunta and Jeff Seeman. Prominent chemist historians and historians of chemistry were invited to contribute essays on the theme “Novel Insights in the History of Chemistry: Looking Back Yet Mostly Looking Forward”.

Bulletin for the History of Chemistry, vol. 47, number 1, 2022,

http://acshist.scs.illinois.edu/bulletin_open_access/bull22-vol47-1.php

Roald Hoffmann, “Foreword”.

Jeffrey I. Seeman and Carmen J. Giunta, “Preface: Happy Centennial to the ACS Division of the History of Chemistry”.

Robert G. W. Anderson, “Epitomizing Chemistry for Changing Audiences in Britain, 1820 -2020”.

Arthur Greenberg, “Mendeleev's ‘Problems’: A Means to Engage Students and Teachers in the History of Chemistry”.

Mary Virginia Orna, “Archaeological Chemistry: Past, Present, Future”.

David Allen Cole, “Can We Bring Chemistry Back? Exploring the Potential of ‘Gateway Artifacts’ at the Science History Institute”.

Anthony S. Travis, “Historiography of the Chemical Industry: Technologies and Products versus Corporate History”.

David E. Lewis, “A Future History of Selectivity in Organic Chemistry: Whence, Where, and Whither?”

John Parascandola, “The Development of Medicinal Chemistry as a Disciplines: A Topic Ripe for Historical Exploration”.

Seth C. Rasmussen, “Moving Beyond the Intersection of Chemistry and History: Evolving Multidisciplinary Approaches to the Historical Study of Chemistry”.

Guillermo Restrepo, “Computational History of Chemistry”.

Sibrina N. Collins, “History of Chemistry as a Tool for the Engagement of Underrepresented Students in Chemistry”.

Marelene F. Rayner-Canham and Geoffrey W. Rayner-Canham, “Out of Obscurity: Contextualizing Forgotten Women Chemists”.

Stephen J. Weininger, “ ‘The Poor Sister’: Coming to Grips with Recent and Contemporary Chemistry”.

Peter J.T. Morris and Jeffrey I. Seeman, “The Importance of Plurality and Mutual Respect in the Practice of the History of Chemistry”.

Olphen and Deeds approached the problem from a different perspective. They synthesised materials from indigo or indigo precursors and palygorskite and compared the products with Maya Blue [10]. They had three approaches: alkaline hydrolysis of indoxyl acetate in the presence of palygorskite followed by aerial oxidation; heating indigo directly with palygorskite; and reducing indigo to leucoindigo with sodium hydrosulphite and contacting the reduced material with palygorskite followed by aerial oxidation. In all three approaches, heating the final solid product for several days at 75°C or shorter at a higher temperature of 105-115°C was found to be an essential step to get a product that was stable to boiling acids and could be considered very similar to Maya Blue.

Structurally, palygorskite has surface channels and tunnels running through the matrix. Olphen and Deeds suggested that the surface channels could bind indigo tightly and render it resistant to acid but suggested that indigo was too large to be accommodated in the tunnels.

In 1967, Kleber et al. reported the synthesis of Maya Blue after Olphen by treating palygorskite with leucoindigo followed by aerial oxidation and heating [11]. They found that stronger heating was required than was suggested by Olphen and used temperatures of 190°C for five hours. Milder conditions were not effective. Comparison of their material with a sample of Maya Blue from a piece of pottery from Tlatelolco (Mexico City) by infrared spectroscopy showed common characteristic indigo peaks in the 1300-1500cm⁻¹ range. However, they were cautious in their interpretation as the amount of indigo needed to give the blue colouration was small and at the limits of detection using their method.

Using thermo-gravimetric analysis, they showed that palygorskite lost the water bound in the tunnels at around 100-120°C thereby making the tunnels more accessible; there was little change to the overall clay structure. Was the coincidence of this temperature and the temperature required to fix the indigo-palygorskite complex significant? As the cross-sectional size of the tunnel was 10.5Å by 6.45Å, running the length of the crystal, Kleber et al. suggested that the indigo molecule, sized at 6.21Å by 3.40Å by 8.48Å, could fit into the opened tunnel thereby rendering the indigo much more resistant to chemical attack.

How Did the Maya Source the Palygorskite?

Shepard examined the range of clays used for pottery available in the Maya heartland in the Yucatan and concluded that palygorskite appeared to be an

uncommon mineral in the Yucatan though it was found in a small area around Ticul.

At Sacalum, near Ticul, the local inhabitants recognised a 'white earth' called '*sak lu'um*' [12]. In the late sixties, Folan identified a sample from the

dye. It is dried in the sun, strained in a hemp bag, shaped into small wheels and hardened on plates over coals and stored for use.

Whilst the Florentine Codex is less detailed it does illustrate the production showing a drawing of the plant (a), the maceration/squeezing of the leaves (b), the small pigment wheels drying over a fire (c), and a painter using the pigment (d). (fig. 2)

Mayan Preparation of Maya Blue.

There is no contemporary evidence describing the making of Maya Blue. Any record could have disappeared in general destruction caused by the Spanish Conquest

Elsewhere, Haude examined the colorants on six early colonial maps created between 1578 and 1585 [27]. Seven green, blue, and blue-green samples were found to be identical to a Maya Blue reference.

Figure 3: The Geographical Spread of Maya Blue.

There are several sites in the Yucatan, southeast Mexico where Maya Blue was identified in wall paintings before 2000. The dots, , show places where Maya Blue has been found and the crossed hammer and pick, ! mark the locations of the palygorskite deposits mentioned in the article.



Adapted by author with addition of symbols and places, map from https://upload.wikimedia.org/wikipedia/commons/b/b4/Map_of_Mexico_De_mis.png

Post 2000

The focus of this article has been work before 2000. Many of the themes covered, have shown significant developments in the last twenty years and there is room here to comment briefly on three areas of research. Firstly, the nature of the interaction between indigo and the clay, palygorskite, has been extensively investigated using a range of spectroscopic techniques and molecular modelling. On balance, the current view favours that of Kleber that the indigo is locked up in the tunnels in the clay interacting through hydrogen bonds with the clay lattice. In parallel studies, several alternative

molecules to indigo, such as thioindigo and methyl red have been incorporated into the lattice to give stable adducts. Secondly, the range of shades in Maya Blue from blue to bluish green in the wall pigments and artefact colours has been the subject of many papers by Doménech. He has proposed that the presence of dehydroindigo is a major cause of the colour shade changes. Lastly, the range of sites where Maya Blue has been identified has expanded significantly, stimulating much discussion about the significance of the colour blue in Maya culture. It may have been associated with the rain god, and by extension with the importance of rain to the cultivation of maize, the essential Maya crop, and hence to life itself.

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1. This historical essay focuses on published work before 2000. Only occasional references to post-2000 work are made.
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3. Morris, Charlot, and Morris, *The Temple of the Warriors at Chichen*

engineering works on the main line. The diversion required the train to slow down to 15 mph from the usual 60-70 mph but, because neither the driver, the fireman nor the guard had read the appropriate notice posted at the Edinburgh Haymarket depot, the diversion came as a surprise to them all and the train was still travelling at high speed. The result was that it jumped the points, causing most of the carriages to be derailed and overturned, with some falling down the adjacent embankment. Most of the twenty-eight people killed died more or less instantly and there were also ninety casualties, including the driver and fireman.



John Masson Gulland (1898-1947)

The subsequent enquiry concluded that the primary causes of the crash were driver error and excessive speed, with fireman error and guard error being contributory factors [3]. The driver, Thomas Begbie, was experienced and in good health. However, he not only failed to read the diversion notice at the depot, but he also failed to see the warning signal just before the train reached Goswick. These errors were compounded by the fact that he had allowed an unauthorised passenger to travel on the footplate, a young man called T.A. Redden who, at the time, was a Leading Stoker in the Navy. Redden's brother worked as a fireman out of Haymarket depot, and was known to driver Begbie. Begbie seems to have agreed to take Redden to London as a favour to his colleague, and there was speculation that

worked under the

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37. E. Chargaff, R. Lipshitz and C. Green, *J. Biol. Chem.*, 1952, **195** (1), 155.
38. D. Elson and E. Chargaff, *Experimentia*, 1952, **8** (4), 143.
39. J.M. Creeth, "Some Physico-Chemical Studies on Nucleic Acids and Related Substances", *PhD dissertation*, University of London, 1948.
40. J.N. Davidson,

about two decades ago, to write a textbook of chemistry, in comic-book

monthly column “Significant Figures”, on women chemists, as well as Greenberg’s *A Chemical History Tour*. Much of my research involved the mundane: what did people wear in the eighteenth century? What kinds of

impossible—not even mine, which is surface chemistry. By necessity the material was pared to a bare minimum along the most general chemical historical path. I avoided biochemistry and analytical chemistry, and lacked space for nomenclature. With all the topics I included, there was no way to go into them in any kind of detail. Essentially the book runs through all of chemical history in 200 pages. A second compromise was that of specific topics. Because the target audience was American teens, I rejected including any controversial topic dealing with sex (i.e., birth-

References

1. See <https://issuu.com/thepunchbowl>, in particular, the April 1985 issue in which my masthead first appears. Variations upon it continue through 2017.
2. The first *Buffer's Solutions* comic appeared in the *Daily Pennsylvanian*, vol. C, no. 75 (18 September 1984), 4, and can be viewed here: <https://dparchives.library.upenn.edu/?a=d&d=tdp19840918-01.2.32&srpos=1&e=-----en-20--1--txt-txIN-Buffer%27s+Solutions---->
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3. S.M. Cohen, "On the Inverse Relationship Between Nutritive Mass and Pecuniary Value", *J. Irrep. Results*, **35** (2), Mar./Apr. 1990, 15; S.M. Cohen, "New Inorganic Analogs to Buckminsterfullerene", *J. Irrep. Results*, **38** (3), May/Jun. 1993, 16.
4. S. Cohen, July, *Scientific Integrity 2007 Calendar* (Cambridge, MA: Union of Concerned Scientists, 2006).
5. <http://www.judaicalligraphy.com>.
6. Larry Gonick and Art Huffman. *The Cartoon Guide to Physics* (New York: HarperCollins, 1991).
7. Larry Gonick and Alice Outwater, *The Cartoon Guide to the Environment* (New York: Collins, 1996); Larry Gonick and Christine DeVault, *The Cartoon Guide to Sex* (New York: Harper Perennial, 1999); Larry Gonick and Mark Wheelis,

3. The dry seaweed is burnt to a slag (or ash) in circular or rectangular kilns.
4. The kelp (slag) or ash is shipped, usually by sea, to the factories for processing.
5. The kelp slabs are crushed into a coarse powder (not needed for ash).
6. The kelp is lixiviated with water in a Shanks system to extract soluble salts.
7. The solution is heated and potassium and sodium salts crystallised out and filtered off.
8. The final liquor is treated with sulfuric acid to remove sulphides, and oxidised with more acid and MnO_2 to produce iodine in an iodine still. Bromine can be made by further oxidation.
9. The impure iodine is dried and purified by sublimation if needed.
10. The iodine is either converted into salts or shipped to the end-users in 1 cwt kegs.

Stanford's modification using enclosed kilns was known as the char process, producing a charcoal from which iodine and salts were extracted in the same way. Later Stanford developed a wet process, without any heating, and thus discovered alginates [11].

Glasgow and the lowlands of Scotland became the major centre for the

12. For example, W. Forsythe, "The Archaeology of the Kelp Industry in the Northern Islands of Ireland", *International Journal of Nautical Archaeology*, 2006, 35 (2), 218-229.

Peter E. Childs

BOOK REVIEW

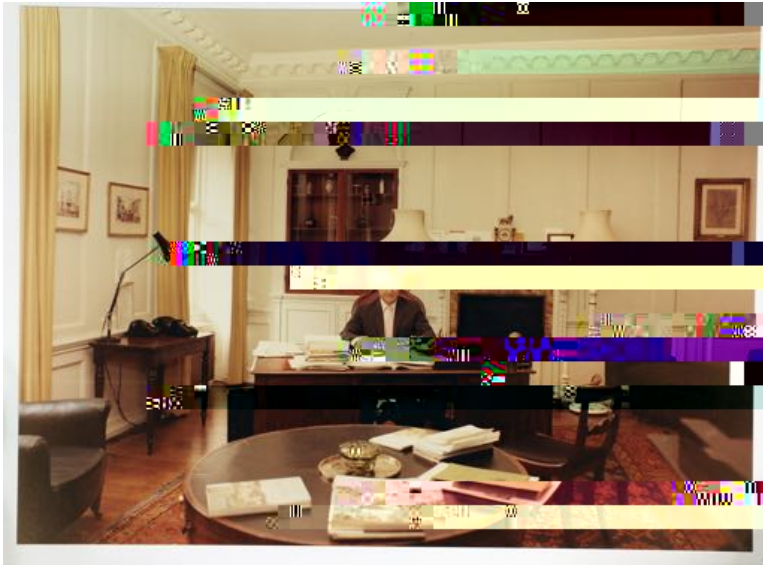
Rebecca Hurrell, Andrew Muscroft-Taylor, Glyn Strange and Bryce Williamson, *Scientific Sleuthing: Chemical Discoveries Made in New Zealand* (Celestory Press, Christchurch, New Zealand, 2017).

A while ago, I contacted several chemical societies in the Commonwealth to find out if they had a historical group. I did not get many responses and the ones I received were generally negative, but the New Zealand Institute of Chemistry sent me the book under review. New Zealand has a record of producing such books. Back in 2002 I reviewed a similar book, *New Zealand is Different: Chemical Milestones in New Zealand History*, for the *British Journal for the History of Science*. New Zealand's biggest problem in this field is that the most important scientists from there have made their

their current condition. How they appear was addressed, together with a reflection on interdisciplinary research in the field.

teaching-research laboratory as a “factory” for producing chemists in large numbers. These chemists would find careers in the burgeoning chemical

many guests who met the Queen after she opened the Faraday Museum in 1973.



The Study in Director's Flat with Sir George Porter sitting at his desk.

who contributed to this success, but none better than Judith Wright, our father's secretary/PA at Sheffield University who also made the move to London and the RI in 1966. Judith's office adjoined the flat and was the first stop on exiting the second-floor lift. She always provided an air of calm, good-humoured continuity and efficiency that was reassuring to us and no doubt to many others.

After a long week, our paren

movement. The paper was split into three sections corresponding to different phases in Porter's career.

The first, periodised as 1959-1967, explored his role as a populariser of science, which began with an appearance in 1959 on the BBC's *Eye on Research* television series. His skills as a lecturer – for adults and children – saw him being appointed as a professor at the Royal Institution, which provided him a stage to engage with debates in the early 1960s on the 'two cultures' and the Second Law of Thermodynamics – C.P. Snow's infamous test question of scientific literacy. His involvement in this debate led to both a ten-part television series that he wrote and presented for the BBC and his appointment as Director of the Royal Institution (RI).

The second phase of Porter's public career, 1968-1973, saw him engaging with a changing landscape for the cultural status of science. From his position as RI director, Porter became a vocal critic of prevailing social movements: the 'counter culture', debating Theodore Roszak, the coiner of the term, on television; the radical science movement, after inviting one of its key figures, in biochemist Stephen Rose, to give a Friday Evening Discourse at the RI in 1971; and the alternative technology communities, following a suggestion to BBC Hor

discussed. Using both experimental and computational studies this group have developed mechanistic understanding, unearthing the potential of the iron(II) -diketiminato pre-catalyst in isotopic labelling chemistry.

Some Adventures with Early Transition Metal Pincer Complexes. – Mark Chadwick (Imperial College)

Pincer complexes hold a privileged position in organometallic chemistry, however their use tends to be dominated by the late transition metals. Arguably the archetypal pincer complexes are those of PCP or POCOP, where a central arene is flanked by two phosphines via either a methylene or an oxygen linker. Across the first row of the transition metal this ligand has been widely used with Nickel, and there are rare reports of its use with chromium, manganese, iron and cobalt, but there are no reports of its use with titanium – until now. This group have been investigating the synthesis and properties of Ti(PCP) and Ti(POCOP) complexes, and their ability to undergo interesting reactivity with small molecules.

Well Defined Catalysts for Azide-Alkyne Cycloadditions, The Good, the Not So Bad and the Unexpected – Silvia Diez-Gonzalez (Imperial College)

Copper(I)-mediated azide-alkyne cycloadditions are considered the most powerful Click reaction to date. Despite this popularity, relatively little efforts have focused on developing efficient catalytic systems, preventing numerous applications from meeting the stringent criteria of Click chemistry. This talk discussed their contribution to the field detailing the influence of the ancillary ligand in terms of reactivity and selectivity in cycloaddition reactions.

From Aluminum Catalysts to COVID – Andy Barron (Swansea and Rice):

Research into alumoxane co-catalysts defined a new structural model and demonstrated the then unknown structure of alumina nanomaterials. Investigations into surface functionality allowed for superhydrophilic functionality that can be used to collapse aspirated water droplets. The presence of viruses such as COVID-19 can be immobilized and destroyed on these surfaces in combination with iron oxide analogues. A new approach to anti-viral PPE was presented.

Solution NMR Studies of Transition Metal Alkane – Gregory Girolami (Illinois):

This talk described recent work on transition

Vilnius University (established in 1579), where the Department of Chemistry was established in 1797. The conference will include scientific sessions, key-note lectures, a poster session, the WP business meeting, as well as social ev