

CHEMICAL INTELLIGENCE

Winter
2024 issue

Society for the History
of Alchemy and Chemistry



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TABLE OF CONTENTS

NEWS

SHAC News

Treasurer's Corner 4-5

New book on Alchemical Laboratories 6-7

EVENTS

SHAC Spring Events 8-11

The Development of the Chemist's Notebook 12-15

PRIZES AND GRANT SCHEMES

Morris Award 16-19

SHAC Award Scheme 20-21

Partington Prize 22-23

PROJECT REPORTS

Individual Project Reports 24-37

SHAC Autumn Meeting 2023 38-43

AMBIX

Ambix book reviews 44-45

Ambix Issues 46-47

ANNOUNCEMENTS

Membership 54

Contribute to *Chemical Intelligence* 55

Treasurer's corner

As I am sure all our members know, it's time to renew your subscription to the society. As I write this in mid-January, over half of our members have already done so and I thank them for their contribution to our coffers. I would urge those who have not yet taken action to do so as soon as possible. We've been making it easier to pay - just go to this web page <https://www.ambix.org/renew-membership/> and click on the appropriate button.

You can pay by credit or debit card without having (or creating) an Account with PayPal. The document on this link shows you how to do it: <https://www.dropbox.com/scl/fi/xw53bdxz0485fmrpnznq8/SHAC-Credit-or-Debit-Card-payment.docx?rlkey=79cu62cx5akem5nb9n-vk6dz6z&dl=0>

If you have a PayPal account you can even elect to take out a recurring payment. This will pay SHAC your subscription from your PayPal account once a year on the anniversary of when you set up the payment.

It is important that you let SHAC know if you change either your email or your postal address. Rather than have you email any of the SHAC officers, there's a web page containing an online form for you to complete. This sends the Treasurer an email containing your data in a layout that is recognised by the SHAC data base so that we can quickly keep your details up to date without introducing errors caused by his (my) appalling typing. The database will even send you an email letting you know we've updated

your data. The link to this web page is <https://www.ambix.org/update-personal-information/>

Finally, SHAC has realised the importance of the web site to the Society and it's members and we have now commissioned an IT expert to help us keep the technical side running properly. I hope you will see an improvement in the service level and, if you come across any missing pages, or broken links please let him know by sending an email to webmaster@ambix.org

That about it from me for this issue of *Chemical Intelligence* apart from letting you know that I'll attempt to keep the emails to you from SHAC down to a dull roar for the next few months rather than the torrent you have been receiving in the last few weeks.

Rob Johnstone

New Book on Alchemical Laboratories

The edited collection *Alchemical Laboratories: Texts, Practices, Material Relics*, edited by Sarah Lang, was published at the end of 2023 (Graz, 2023). This book is based on the 2020 international symposium in Vienna and Oberstockstall, exploring early modern chymical laboratories, which was supported by a 2020 SHAC Subject Development Award.

With a diverse array of articles, this volume examines alchemical experiments as courtly spectacles, the materiality of chymical practices, and daily operations in chymical laboratories. It combines textual evidence and material relics, like the 16th-century laboratory at Oberstockstall Manor in Upper Austria and alchemical medals from the Kunsthistorisches Museum Vienna, to provide insights into the technical and social aspects of alchemy. The DOI for the open-access publication is <https://doi.org/10.25364/9783903374041>.



SHAC

SPRING

EVENTS

SHAC Spring meeting Call for Papers

The Society for the History of Alchemy and Chemistry invites abstract submissions for its Annual Spring Meeting, to be held at the University of Oxford (Maison Francaise d'Oxford) on 28 May 2024. The meeting will be hybrid, although we strongly encourage in person attendance. The keynote speaker is Prof. Jennifer M. Rampling (Princeton). The theme is 'From Late Antique to Early Modern Alchemy: New Approaches, New Horizons'.



Photo by Sameer Khan

Under this broad remit, we encourage submissions that explore:

- New methodologies and approaches to the study of alchemy / chymistry
- Interdisciplinary perspectives setting alchemy / chymistry in dialogue with other fields of learned or craft knowledge
- Case studies of individuals, groups, or institutions pursuing alchemy / chymistry in conjunction with other fields of knowledge
- The material, visual, and experimental cultures of alchemy / chymistry
- Diverse sites of alchemical / chymical practice

The submissions can be individual presentations, panels with 3 speakers or roundtable proposals. Presentations should not exceed 20 minutes in length.

Please submit your abstract, together with a CV or a paragraph detailing your background, to: [georgiana.hedesan \[AT\] history.ox.ac.uk](mailto:georgiana.hedesan@history.ox.ac.uk) by 1 March. 2024.

Please address any queries to the same address.

Online seminars

The next SHAC online seminar will be held on 21 March at 5pm London time and will be given by Professor Robert Fox on his new book on Thomas Garnett.

The next seminar will be held on 23 May at 5pm - details to follow.

Full details and links will be circulated in due course.



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March 10th 1876



The Development of the Chemist's Notebook

This one-day in-person meeting organised by the Historical Group of the Royal Society of Chemistry will take place on Wednesday 13 March 2024, 10.30-17.00, at Burlington House, Piccadilly, London W1J 0BA.

see you" To my delight he came and declared that he had heard and understood what I said. For many centuries chemists have used notebooks to record their experiments, results, literature research and thoughts. This meeting will feature analysis of the notebook practices of some famous chemists starting from the time of Robert Boyle and consider their evolution until their most recent manifestation in electronic form.

For more information and to book please go to <https://www.rsc.org/events/detail/77987/the-development-of-the-chemist-s-notebook> or email Peter Morris, Historical Group Secretary, directly at doctor@peterjtmorris.plus.com, giving your name, email address and any special requirements. The event is free of charge. Coffee and tea will be available, but lunch is not included, although there are plenty of cafes nearby in Piccadilly and adjoining streets.

Morris Award 2024

Call for Nominations

The Society for the History of Alchemy and Chemistry solicits nominations for the 2024 John and Martha Morris Award for Outstanding Achievement in the History of Modern Chemistry or the History of the Chemical Industry. This award honours the memory of John and Martha Morris, the late parents of Peter Morris, the former editor of *Ambix*, who has contributed the endowment for this award. The recipient chosen to receive the Morris Award will be expected to deliver a lecture at a meeting of SHAC, where the awardee will be presented with an appropriate framed photograph, picture or document and the sum of £300. The award is international in scope, and nominations are invited from anywhere in the world. Past winners of the Award include Ernst Homburg, Yasu Furukawa, Anthony S. Travis, Mary Jo Nye and Raymond Stokes.

A complete nomination consists of

- a complete curriculum vitae for the nominee, including biographical data, educational background, awards, honours, list of publications, and other service to the profession;
- a letter of nomination summarising the nominee's outstanding scholarly achievement in either the history of the chemical industry or in the history of recent chemistry (post -1945) and the unique contributions that merit this award; and
- names of two or three individuals for the panel to contact for further information if needed.

Only complete nominations will be considered for the award and the nomination documents must be submitted in electronic form. The Award will be judged by the selection panel on the basis of scholarly publication.

All nomination materials should be submitted by e-mail to Peter Morris at doctor@peterjtmorris.plus.com and a separate email which indicates that the material has been submitted should be sent to the same address (a precaution in case of incomplete transmission of documents) for arrival no later than 1 May 2024.

Society for the History of Alchemy and Chemistry Award Scheme 2024

Opening date: 1 March 2024

Closing date for
applications: 31 May 2024

The Society for the History of Alchemy and Chemistry invites applications for its Award Scheme for 2024. SHAC offers two types of award: support for research into the history of chemistry or history of alchemy by both new and independent scholars and support for Subject Development of either history of chemistry or history of alchemy. It is expected that applicants will be advised of the outcome of their application by 31 July 2024. The Awards are most suitable for activities planned to be undertaken during the period August 2024–September 2025. However, in exceptional circumstances applications for activities planned for June 2024 and July 2024 will be considered. A two year window for completion of all Awards will be given.

Research Awards are open to post-graduate students (both masters and doctoral students), those who have obtained a PhD since 1 January 2014 and also to independent scholars. Given that the circumstances of independent scholars differ we are letting members ‘self-define’ and if there are any unclear cases it will be left to the discretion of the Awards Panel.

Awards of up to £1000 will be made to cover research expenses, including travel, accommodation, subsistence (at the discretion of the award panel), the copying or scanning of documents, and library fees. Applications may also include the costs of reproducing images for publication. The Scheme does not fund the purchase of equipment or course fees. It does not cover the costs of Open Access publication.

In addition, those who have obtained a PhD since 1 January 2014 and independent scholars may apply for the costs of travel to conferences and accommodation, but only in order to give a paper. The Scheme does not pay conference registration fees.

Subject Development Awards of up to £1000 may be made to support activities such as seminars, workshops, colloquia,

lecture series, conference sessions, conferences, exhibitions and outreach activities that support either the history of chemistry or history of alchemy as academic subjects. The Awards do not cover the costs of refreshments or catering for these events. The Scheme does not cover the costs of Open Access publication. Please note that activities covered by the Awards do not have to occur in the UK, and that the Awards are open to members of the Society resident both in the UK and elsewhere. Members who have applied to the Scheme in previous years, whether successfully or not, are entitled to make an application in 2024. Members are only permitted to make one application to each annual Award Scheme.

Applicants must be members of the Society in good standing at the time of making an application, and, if successful, throughout the period of an award. For more information and application forms, please contact grants@ambix.org. Membership enquiries should be made to newjoiner@ambix.org.

An activity report must be submitted at the end of the Award. This will usually be published in SHAC’s *Chemical Intelligence* newsletter.

Partington prize 2023

The Society for the History of Alchemy and Chemistry is delighted to announce that Armel Cornu's Partington Prize winning essay "Senses and Utility in the New Chemistry" is published [Open Access in the November 2023 issue of *Ambix*](#).

Armel Cornu is a postdoctoral researcher funded by the Swedish Research Council and based at the University of Uppsala in Sweden and the ICT department in Paris. She obtained her doctorate at the University of Uppsala in 2022 with a dissertation titled: "Enlightening Water: Science, Market & Regulation of Mineral Waters in Eighteenth-century France," before completing a postdoctoral fellowship at the Science History Institute in Philadelphia, Pennsylvania. Her research is characterised by a social and economic approach to the development of chemistry throughout the Enlightenment.

The Partington Prize was established in memory of Professor James Riddick Partington, the Society's first Chairman. It is awarded every three years for an original and unpublished essay on any aspect of the history of alchemy or chemistry. The prize consists of five hundred pounds (£500). The competition is open to anyone with a scholarly interest in the history of alchemy or chemistry who, has not reached thirty-five years of age, or if older is enrolled in a degree programme or has been awarded a master's degree or PhD within the previous three years. Previous prize-winning essays can be viewed at: <https://www.tandfonline.com/journals/yamb20/collections/best-paper-partington-prize>



Armel Cornu and Frank James

SHAC was delighted to present Eleanor Smith the Oxford Part II prize. Congratulations!



Malika Basu
(Ghosh)

History of Pharmaceuticals in India and United Kingdom in the 19th Century: A Historical Perspective (1821 – 1880)

The present research entitled, 'History of Pharmaceuticals in India and United Kingdom in the 19th Century: A Historical Perspective (1821 – 1880)' is a new kind of attempt which aims to investigate the historical consequences for the development of pharmaceutical industries both in India and United Kingdom(UK) from a cross-cultural perspective. The 19th century marked a pivotal period in the history of pharmaceuticals in both India and the United Kingdom, characterized by a confluence of scientific advancements, industrialization, and the globalization of medical practices. From 1821 to 1880, significant developments

unfolded, shaping the trajectory of healthcare in these regions.

In colonial India, the 19th century witnessed the introduction of Western medicine by the British colonial rulers. The East India Company's endeavors to establish a robust healthcare infrastructure led to the establishment of pharmaceutical industries. Notable among them was Butto Krishna Paul & Co, founded in 1892, which emerged as one of the earliest Indian pharmaceutical companies. This period saw a fusion of traditional Ayurvedic and Unani medicine with Western pharmaceutical techniques. Indigenous drug manufacturing gained momentum as these companies endeavored to meet the healthcare needs of the diverse population. Bengal Chemical & Pharmaceutical Works Limited, established in 1901, also played a crucial role. It exemplified the synthesis of traditional knowledge and modern pharmaceutical practices, contributing significantly to the industrialization

of medicine in colonial India. These endeavors laid the foundation for a self-reliant pharmaceutical industry, blending the rich heritage of Indian medicine with the advancements of the Western world.

Simultaneously, in the United Kingdom, the early to mid-19th century was marked by the emergence of pharmaceutical companies that played key roles in shaping the modern pharmaceutical landscape. May and Baker, founded in 1834, started as a modest apothecary in London. Over time, it evolved into a major pharmaceutical manufacturer, contributing to the industrialization of medicine. This period saw a shift from traditional apothecaries to larger, more research-oriented enterprises. The emphasis on scientific research and innovation became evident with companies like Burroughs Wellcome, established in 1880. Known for its contributions to medical treatments and vaccines, Burroughs Wellcome exemplified the changing

dynamics of the pharmaceutical industry in the Western context during the 19th century. The 19th century also witnessed the standardization of pharmaceutical practices. In the United Kingdom, May and Baker, along with other emerging companies, played a crucial role in setting up standardized production processes. This shift from individualized compounding towards mass production marked a transformative period in pharmaceutical manufacturing. Similarly, in colonial India, the pharmaceutical industry began to adopt standardized practices, contributing to the growth and commercialization of medical products.

Global trade and imperialism further influenced the pharmaceutical landscape in both regions during this period. In the United Kingdom, the expansion of the British Empire facilitated the acquisition of raw materials from various colonies, contributing

to the growth of the pharmaceutical industry. In India, however, the pharmaceutical sector faced challenges related to the exploitation of indigenous resources and labor by the colonial powers.

In conclusion, the history of pharmaceuticals in India and the United Kingdom during the 19th century (1821-1880) reflects a complex interplay of socio-cultural, economic, and scientific factors. The era witnessed the establishment of indigenous pharmaceutical industries in response to colonial influences, the fusion of traditional and modern medical practices, and the standardization of pharmaceutical processes. These developments laid the groundwork for the modern pharmaceutical landscape, leaving an enduring impact on global healthcare practices. The period stands as a testament to the dynamic evolution of medicine, with each region contributing to the rich tapestry of pharmaceutical history.



Ana Luiza Nicolae

The 13th International Conference on the History of Chemistry was my first experience at a major international academic event. It went beyond my best expectations. The panel on the rites and the institution of international conferences provided an insightful *mise en abîme* of the process I was experiencing for the first time. During the conference dinner on the first night, I spoke and laughed with much more experienced scholars, sometimes about shared pieces of knowledge, others about common experiences that lend themselves to hilarity. During the beautiful excursion to Trakai and Kernave, I witnessed senior and respected scholars learn with curiosity from up-and-coming members of the

the academic community. This gave me hope and an example of the importance of new work, and the possibility of productive communication between mentors and mentees. The moments of individual connection interspersed throughout the conference provided me with the confidence of asking questions about the functioning of academic institutions, and the role of history of chemistry in today's academic space. This led to a broadening of what "community of scholars" means to me. I have learned that academics rely on their factual work and knowledge as much as the trust of their peers to make projects possible and endurable through wavering funding and the requirement of immense intellectual labor.

After my talk, I thought my only feedback would come by way of the questions I would be asked in the short follow-up period. Yet, I was amazed that throughout the following days of the conference,

various people in attendance came up to me and offered ideas that my research sparked in them, connections to existing literature, as well as questions more insightful than what answers I could muster in the moment. I was bewildered to feel the swarm of benevolent attention to a topic of research I thought would only interest very few, and I was warmed by the encouragements I received from so many. Various scholars asked me about my future plans, and upon telling them of my beginning a PhD program in the Fall, they each offered their best advice for my path forward.

In the round table with young scholars on the last day, a question was launched to the panel: What is missing from this conference, and what trends have you noticed? Listening to the analytical comments advanced by the panellists, I do believe what was overlooked is the future role of History of Chemistry with respect to its STEM sister, Chemistry,

as well as to public engagement and science communication. On account of the complexifying processes which historians of the most recent centuries have to delve in, I wonder how the History of Chemistry will adapt, alongside other disciplines such as Science, Technology and Society (STS) studies, and the broader fields of History and Philosophy of Science, to both communicate and analyze the scientific processes at hand. It was a great honor for me to be the youngest presenter at the conference, and I am immensely humbled by all the feedback, formal and informal, that I have received in this endeavor. I daresay I have become friends with many new scholars and this opportunity has provided me with enormous encouragement for the future. Thank you immensely for your support and the possibility to make this first trip a success!

Meagan Allen

I used the award to present a paper at the International History of Chemistry Society Conference in Vilnius, Lithuania. I presented in the SHAC-sponsored panel “New Approaches to the History of Alchemy and Chemistry.” My paper was on the difficulties of using chemical replication as a tool to understand medieval alchemical medicine and pharmacology. It is my belief that there is a desire, especially in the fields of early pharmacology, to use replication for modern purposes – that is, to develop new pharmaceuticals and antibiotics. However, such replications are difficult, as the goal of medieval alchemical pharmacology was often not to treat a specific disease, but to prolong life and improve morals. I argued in my paper that replications should continue to be done as a tool to understand premodern alchemical

medicine but not as a way to develop new drugs, but to understand the practices of the alchemists themselves. If we are determined to ask if their remedies are “effective”, we should use their own tests, rather than 21st century tests. This will also help us understand what medieval alchemists considered to be “effective”.

I also participated in the closing roundtable, where I was asked to share my reflections about the conference, as well as my opinions about the future of the field of history of chemistry. I gave 4 main points: 1. There were many junior scholars in attendance, speaking to the continued strength of the field; 2. History of chemistry is broadening in scope to include other related fields, such as pharmacology and toxicology; 3. Participants demonstrated many different ways to study the history of chemistry, including replication, digital

humanities, archaeology, etc. Historians are also looking at the silent actors (lab workers, wives, assistants) who made the scientific discoveries possible; and 4. The geographical range of places covered in the history of chemistry is expanding, both in terms of the topics studied, but also the historians themselves.

Agnese Benzonelli

The project aimed to better understand the nature of the black-patinated material which Zosimos of Panapolis called “Corinthian bronze”, the manufacture of which is detailed in a series of recipes in Manuscript 6.29 stored in the University of Cambridge library.

The experimental work was carried out by Agnese Benzonelli, Matteo Martelli, and Giacomo Montanari at the Chemistry Department of the University of Bologna for five days.

Firstly, three recipes of Zosimos have been re-translated by Matteo Martelli to accurately evaluate the specific ingredients of the recipes, their amount, and the patination procedure. Comparisons were also performed with the only other English

translation of the Syriac recipes, which revealed many translation errors and inaccuracies, such as the confusion of the units of measurement and the absence of recipes.

Secondly, we planned a systematic series of experiments aimed to test 1) two ambiguous ingredients, translated respectively as Azurite or Salt Ammoniac and Iron Vitriol or Copper vitriol, on one alloy composition (copper-gold-silver alloy) and 2) some unclear procedure during the patination process.

Six alloys have been produced by melting the metallic element (Cu, Au, Ag) in the proportions suggested by Zosimos’ recipes. The tokens were hammered and annealed repetitively, obtaining a flat and larger surface, which was polished using sandpaper.

Thirteen patination recipes have been tested, and three dark patinas have been achieved.

The results of the experiments showed that the strict reproduction of the recipes using all the options for the dubious ingredients described by Zosimos does not produce a stable black patina as believed. Dark patinas were achieved using the same ingredients proposed by Zosimos, particularly azurite instead of salt ammoniac, but using a revisited procedure based on the experience acquired during the experiments. The resulting patinas have been analysed using digital optical microscopy, XRF, and SEM-EDS. The results showed the presence of cuprite as the main mineralogical phase.

The project combined innovative textual investigations of the first Syriac-Arabic texts with experimental replications of ancient alchemical procedures. It successfully advanced our understanding of the manufacture of the mysterious Corinthian bronze. It also highlighted many difficulties in the translation and replication

of alchemical recipes. The importance of laboratory reproduction, a more material-grounded translation of alchemical recipes, and the need for a detailed analysis of the original text and the reference to its original Greek text will be included in a methodological paper in *Ambix*. The experiment's outcome will be part of this publication as an exemplar case study.

Sean Coughlin

Thanks in part to a generous Subject Development Award from the Society, from 7–8 November 2023, a conference titled “Perfume Production in the Ancient World” was convened at the Villa Lanna of the Czech Academy of Sciences in Prague. Forty researchers explored the history of ancient perfumery, a critical intersection of practical chemistry, cultural history, and global exchange. Convened by historian of Greco-Roman medicine Laurence Totelin, Egyptologist Heike Wilde, and myself, Sean Coughlin, a historian of Greco-Roman science, the conference fostered an interdisciplinary exchange of this fascinating subject.

Ancient Egyptian perfume vessel in shape of a monkey; 1550-1295 BC; faience; height: 6.5 cm, width: 3.3 cm, depth: 3.8 cm; Metropolitan Museum of Art (New York City)



Global Practice and Interdisciplinary Challenge

Perfumery in the ancient world involved the manipulation of natural products through extraction, isolation, mixing, and storing. These techniques and their apparatus are a fundamental part of chemistry's history. Perfumery's global range, however, means that assembling this history requires expertise in multiple languages, scientific disciplines, and the art and science of perfumery itself.

Conference Aims and Themes

Our aim was to challenge traditional, monolithic ideas of ancient perfumery cultures (“Egyptian”, “Roman”) and explore how ingredients and methods travelled across cultures, lands, and time. We also sought to understand how perfumery and the production of scented materials varied within the same culture.

Highlights and Contributions

There were about twenty talks from established and early career researchers covering pre-history to the early Middle Ages. The following offers only a sniff of two full days of discussion.

Maria Rosaria Belgiorno (CNR) discussed evidence for distillation in ancient perfumery and suggested a larger role than traditionally thought. Giuseppe Squillace (Calabria) examined the distinction between ancient perfumers and sellers, revealing trade secrets and ingredients. Beatrice Caseau (Sorbonne) investigated Late Antique Christian perfumes and their recipes, while Anya King discussed early Islamicate perfumery, showcasing new ingredients, methods and compounds.

Experimental replication played an important role for many talks. Eduardo Escobar and Giacomo Montanari (Bologna) demonstrated how

lexical tools, replication, and multivariate analysis help with identifying and understanding the oldest Assyrian perfume recipe (and oldest existing chemical text) from 1230 BCE. Katarzyna Gromek (independent scholar) presented recreations as a means of understanding early Chinese perfumery. And Alice Capobianco (Genova) showed ethnoarchaeological approaches to Roman ointment production, connecting ancient and modern techniques.

Archaeology and archaeometrical analysis were also showcased. Jay Silverstein (Nottingham-Trent) provided insights into the Hellenistic perfume industry at Tell Timai in Egypt, while Barbara Huber (Max Planck Institute for Geoanthropology) presented new methods of studying the distribution of incense materials in ancient South Arabia.

Finally, organic chemists, perfumers and olfactory artists presented a modern perspective. Roberto P. Dario highlighted changes in materials sourcing and blending procedures from ancient times to the 18th century, while perfumer Miguel Matos and olfactory artist Klara Ravat offered insights into the personal and creative aspects of perfume and scent.

Conclusion

The conference bridged disciplines and placed perfumery within the broader narrative of chemistry's practical and cultural history. It also set a foundation for future research, with participants aiming to meet in 2024 to produce a volume on the global history of perfume production in the ancient world.



Late Hellenistic glass gold-band mosaic alabastron (perfume bottle); 1st century BC; glass and gold leaf; Metropolitan Museum of Art



SHAC Autumn Meeting - 'Alchemy and Chemistry in the Long Eighteenth Century'

One day in-person meeting held on Saturday
25 November 2023, University College London

Malika Basu
Alchemy to Chemistry in the
Long Eighteenth Century - In-
credible changes within the
Indian Historical Tradition

Hjalmar Fors (remote)
The alchemists children: Man-
aging an alchemical heritage in
the 18th Century

Presentation of SHAC's Oxford
Part II Prize to Eleanor Smith
and the Partington Prize to
Armel Cornu

Armel Cornu
Reintroducing the Senses in
Narratives of Eighteenth-cen-
tury Chemistry

Mieke Adriaens and Pieter
Beck
Replicating the Fontana-Ingén-
housz eudiometer

Anna Simmons
Inside the shop: Women, Apoth-
ecaries and Pharmacy in the
Long 18th Century

Nicholas Zumbulyadis (remote)
The Beginnings of Cobalt
Chemistry in the early 18th Cen-
tury (1700-1730)

Matthew Eddy
The Inquiring Diarist: Jane Ew-
bank and the Cultural Context
of Experimental Philosophy in
Late Georgian Yorkshire

John Christie
Past and Presence: Alchemy and
Chemists in the European Long
18th-Century

Hasok Chang
The forgotten history of contact
electrochemistry

Malika Basu: Alchemy to Chemistry in the Long Eighteenth Century - Incredible changes within the Indian Historical Tradition

The transition from alchemy to chemistry during the long eighteenth century holds a significant place within the annals of scientific evolution, not only in the Western context but also within the rich tapestry of the Indian historical tradition. During the long eighteenth century, India experienced a multifaceted metamorphosis from alchemical doctrines rooted in metaphysical speculations to empirical scientific principles underpinning chemistry.

In such a backdrop, the present attempt aims to trace the shifts in philosophical paradigms, experimental methodologies, and socio-cultural influences that contributed to the development of modern chemistry. The present study hopes to investigate (i) the cross-cultural exchange catalyzed by colonial encounters, enabling the infusion of European scientific concepts into the Indian intellectual milieu, (ii) the socio-cultural

dynamics, such as the rise of the Bengal Renaissance and the advent of enlightened rulers, acted as catalysts for the promotion of scientific inquiry and (iii) the contributions of prominent chemists, who played a pivotal role in shaping this transformation across generations. Through a comprehensive analysis of primary texts, manuscripts, and historical records, this research offers an analytical perspective on the ways in which alchemy transformed into chemistry with broader intellectual currents and cultural shifts of the Long Eighteenth Century in India.

The study reveals that the evolution from alchemy to chemistry during the long eighteenth century within the Indian historical tradition represents a compelling narrative of transformation, influenced by indigenous knowledge, cross-cultural exchanges, and socio-cultural shifts. The synthesis of mystical wisdom and empirical investigation paved the way for a harmonious coalescence of alchemical heritage with modern scientific thought, positioning India as an active participant in the global scientific discourse. This abstract serves as a window into the nuanced journey that underscores the vibrant transition from alchemy to chemistry within the Indian context, highlighting the remarkable fusion of tradition and modernity.

Mieke Adriaens and Pieter Beck: Replicating the Fontana-Ingenhousz eudiometer

In 1772, the English chemist Joseph Priestley (1733-1804) published an article detailing his discovery of a new gas, which he called “nitrous air” (nitrogen monoxide or NO in contemporary terms). A striking feature of this gas was that when it combined with atmospheric air, it turned into an orange-brown gas (NO₂). Also, when nitrous air was combined with a sample of atmospheric air kept under a glass jar over water, it seemed to reduce the volume of the atmospheric air. Most importantly, this reduction was proportionate to the “breathability” of the air. This discovery marked the start of 18th-century “eudiometry”, the practice in which instruments were developed and used to test the “goodness” of atmospheric air, the so-called “eudiometers”. The first eudiometers used nitrous air, but soon other substances were used such as phosphor, alkaline sulfides or hydrogen.

The term “eudiometer” was coined by the Italian

Marsilio Landriani (1751-1815). In 1775, both he and his compatriot Felice Fontana (1730-1805) independently of each other published a tract in which they provided an outline for specific designs of a eudiometer. Fontana’s work contained eight different versions of the instrument. It was the work of the Dutch-born British Jan (John) Ingenhousz (1730-1799) that gave rise to the popularity of a specific version of the Fontana-eudiometer. Ingenhousz is best known for his work on the process that would later be called photosynthesis. He showed that plants produced oxygen (“dephlogisticated air”) in the sun and carbon dioxide (“fixed air”) in the dark. The eudiometer played an important role in these investigations as a means to test the air produced by plants.

In this paper, we discuss our attempt to replicate Ingenhousz’ eudiometric procedure. We performed a long series of experiments, for which we collaborated with MA and BA students. The experimental work performed by the students was part of their coursework. The aim of the paper is twofold. First, we discuss what we have learnt from the replications in relation to the information found in the historical sources. Second, we discuss our experiences in working with the students and argue for the

benefit of including this type of experimental reconstructions in chemistry education.

Anna Simmons:
Inside the Shop: Women, Apothecaries and Pharmacy in London in the Early Eighteenth Century

In recent years, our understanding of women's contributions to science and medicine in the early modern period and beyond has developed significantly. A more complex and nuanced picture has emerged of practice which highlights the healthcare services that women provided to household and community. This was also a period when there was massive growth in the volume of drugs imported into England and major expansion in the consumption of medicines, with London Apothecaries one of the key groups of practitioners involved in the processing and supply of medical drugs. Women's roles in pharmacy have been given particular attention through detailed studies of recipe books and household science. However less is known about women's contributions to pharmacy

within the established guild system in London. This paper presented a preliminary exploration of the activities of women in pharmacy in the early eighteenth century and their roles in family businesses as wives and widows. Building on the wider historiography of women in business, it used case studies from the records of the City of London Livery Company, the Society of Apothecaries, to explore women's involvement in the apothecaries' shops of London.

Nicholas Zumbulyadis:
The Beginnings of Cobalt (Solution) Chemistry in the Early 18th Century (1700-1730)

The processing of cobalt ore to produce a blue pigment was already known in antiquity. With one possible but conjectural exception, the early treatments of cobalt ore used melt processing techniques. The earliest recorded descriptions of cobalt solution chemistry date to the first third of the 18th century. They are part of the observations that lead Georg Brandt in 1735 to classify cobalt as a semimetal distinct from bismuth.

They are part of the observations that lead Georg Brandt in 1735 to classify cobalt as a semimetal distinct from bismuth. The talk will present a discussion of the first account for the preparation of a pure cobalt salt to be used as a colorant, recorded by Johann Gregorius Höroldt in 1731. The manuscript, retained in the Meissen Porcelain Manufactory archives, was transcribed and translated in its entirety for the first time as part of the present study. Höroldt's procedure involves fractional precipitation, a sophisticated step at a time when concepts like pH and solubility product constants were totally unknown.

About half a century following Höroldt's proprietary, highly secret and therefore unpublished recipe, the Prussian mining councilor, chemist and mineralogist Carl Abraham Gerhard, independently came up with essentially the identical procedure that Höroldt had developed fifty years earlier. Gerhard's procedure was published in the *Nouveaux Mémoires de l'Académie Royale des Sciences et Belles Lettres* in 1779.

In 1784 Rudolph Adam Abich, councilor of mines in the Duchy of Braunschweig-Wolfenbüttel published an even more detailed account of the purification procedure including Höroldt's fractional precipitation step in *Crell's Chemische Annalen*.

The earliest documented example of cobalt solution chemistry and the preparation of novel cobalt compounds such as cobalt chloride was by the late alchemist Dorothea Juliana Wallich. She was also the first to record the changes in the color of cobalt compounds induced by variations in moisture and temperature and published her observations during 1705-1706 in her book on her quest for the philosopher's stone, titled *Schlüssel zu dem Cabinet der geheimen Schatzkammer der Natur*. (*) The documents were written within a span of 75 years. They represent three distinct approaches and styles, that of the alchemist, the artisan, and the scientific-technical expert.

(*) For a brief but very informative essay on Wallich, see A. Craft, "Dorothea Juliana Wallich (1657-1725) and Her Contributions to the Chymical Knowledge about the Element Cobalt" in *Women in their Element*, (A. Lyknes and B. van Tiggelen, eds.) pp. 57-69, World Scientific (2019).

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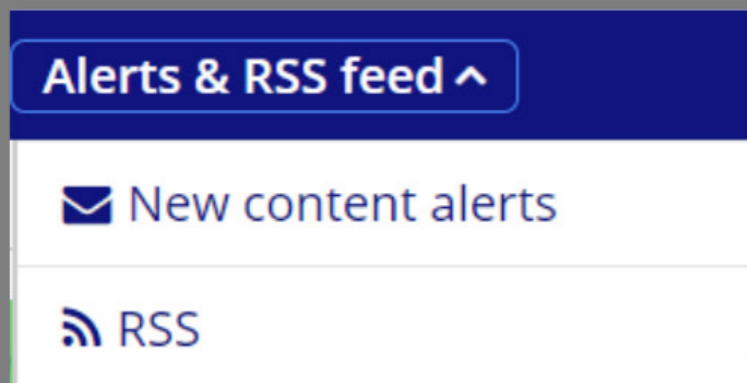
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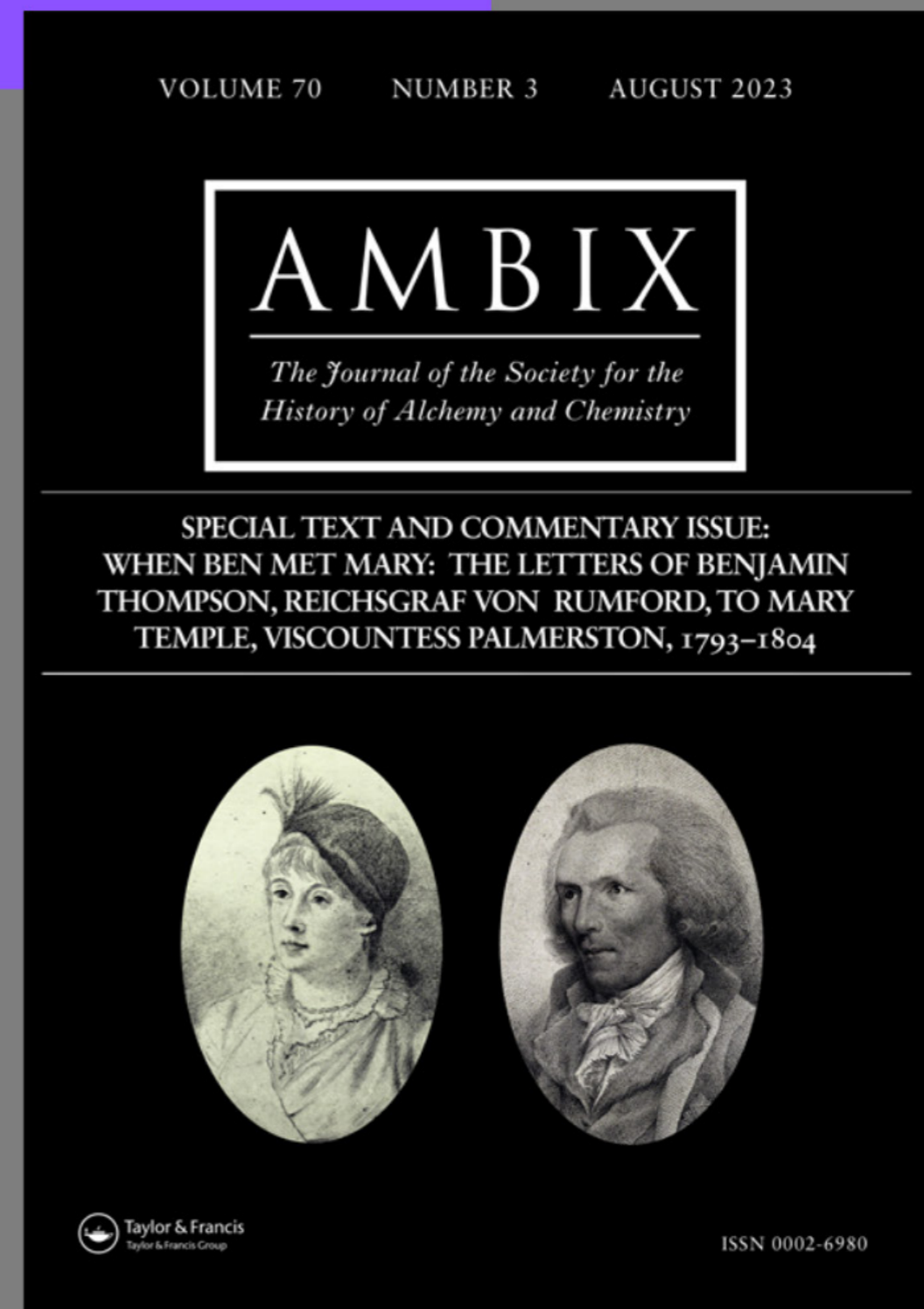
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Volume 70, Issue 4 (2023)

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