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COMMISSION ON THE HISTORY OF MODERN CHEMISTRY

CHMC

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CHMC Activities Report 2001–2005

I. General

I.1 Aims and History

The Commission on the History of Modern Chemistry is a Commission of the International Union of History and Philosophy of Science / Division of History of Science. The aim is to focus interest on, and to create a framework for, research on the history of modern chemistry with particular emphasis on twentieth-century chemistry in its relationship to the biomedical sciences, physics, instrumentation, and technology.

- CHMC organises scientific symposia at the International Congresses of the History of Science and, if possible, in the years in between these congresses.
- CHMC establishes efficient means of communication for historians of chemistry from all over the world through the electronic news bulletin and mailing list CHEM-HIST.
- CHMC maintains contacts with other scholarly associations and societies devoted to the history of chemistry or to the history of science and technology. It co-operates with other DHS Commissions and Scientific Sections.
- CHMC seeks to encourage other initiatives in the historiography of modern chemistry.

The formation of CHMC was proposed by Robert Halleux and Christoph Meinel at the XX. ICHS in Liège, Belgium, in 1997 as a sort of follow-up initiative to a research network on “The Emergence of Modern Chemistry, 1798–1939” run by the European Science Foundation from 1993 to 1998. It was accepted as a Scientific Commission of the Division of History of Science by IUHPS/DHS Council on 21 December 1997, effective from 1 January 1998. The mission of CHMC was approved and extend by DHS General Assembly during the XXI. ICHS in Mexico City in 2001.

There is no formal membership. Everybody with a scholarly or professional interest in the history of chemistry who communicates and co-operates within the Commission is considered a member.

From 1998 to 2000, CHMC has organised a series of international conferences and workshops:

- Between Science and Economy: Research in the German Chemical and Pharmaceutical Industry, 1900-1945", Deutsches Museum, Munich, Germany, 29 June 1998
- Recent Issues in the Historiography of Chemistry", Sidney M. Edelstein Center for the History of Science and Technology, The Hebrew University, Jerusalem, 23–24 July 1998
- "Between Physics and Biology: Chemical Sciences in the Twentieth Century", Deutsches Museum, Munich, 28–30 May 1999
- „The Environment: Historical Context and Present Day Perspectives", Sidney M. Edelstein Center for the History and Philosophy of Science, Technology, and Medicine, The Hebrew University, Jerusalem, 7–9 November 1999
- „From Test-Tube to the Autoanalyzer: The Development of Chemical Instrumentation in the Twentieth Century", Imperial College, South Kensington, London, 10-13 August 2000

I.2 Board and Communication

In the period 2001-2004 the Board was as follows: Executive Committee: President: Christoph Meinel, Regensburg (Germany); Vice Presidents: Bernadette Bensaude-Vincent, Paris (France); Mary Jo Nye, Corvallis (USA); Executive Secretaries: Peter Morris, London (UK), Anthony Travis, Jerusalem (Israel); Treasurer: Carsten Reinhardt, Regensburg (Germany). Advisory Board: Arnold Thackray (Chairman), Philadelphia (USA), Luigi Cerruti, Turin (Italy), Hendrik Deelstra, Wilrijk (Belgium), Yasu Furukawa, Tokyo (Japan), Kostas Gavroglu, Athens (Greece), Ernst Homburg, Maastricht (The Netherlands), Jeffrey Johnson, Villanova (USA), Gabor Pallo, Budapest (Hungary), Xavier Roqué, Bellaterra (Spain), Ana Simões, Lisbon (Portugal), Leo Slater, Baltimore (USA), Nasir Tyabji, New Delhi (India). CHMC boast of having two distinguished Chemistry Nobel Laureates to act as CHMC's Honorary Patrons: Manfred Eigen, Göttingen (Germany, Nobel Laureate 1967); Roald Hoffmann, Ithaca (USA, Nobel Laureate 1981).

Business meetings of Executive and Advisory Board of the Commission were held in Mexico City (July 2001), Philadelphia (September 2002), and Paris (September 2004). Their purpose was to evaluate the conferences, give advice on publications, discuss proposals for future conferences and CHMC policy matters. In the time between the Board meetings Executive and Advisory Board members were kept informed on CHMC activities by e-mail. In addition, conferences and other activities are announced on the CHMC homepage <http://www-wissenschaftsgeschichte.uni-regensburg.de/CHMC.htm>. Communication among members at large is maintained by the electronic mailing list CHEM-HIST <http://www-wissenschaftsgeschichte.uni-regensburg.de/ch.htm>, run by CHMC Executive Board. During the past years CHEM-HIST maintained its high level of discussion and membership (450–480 members from all over the world, including a fair proportion of members from smaller countries).

Attempts at strengthening the ties between CHMC and the International Union of Pure and Applied Chemistry (IUPAC) have not led to any definitive cooperation, because the formation of joint commissions is no longer part of IUPAC's official policy. Therefore alternative measures have been taken to make CHMC better known in the chemical community. As a consequence, both CHMC and CHEM-HIST are now linked at several major international internet platforms of chemistry. In that regard, additional support is required from CHMC Advisory Board.

II. International Conferences

II.1. Symposium 2001 (Mexico City)

During the XXIst International Congress of History of Science at Mexico City, July, 2001, CHMC organised a one-day symposium „Shifting Centres and Emerging Peripheries: Global Patterns in Twentieth Century Chemistry". The theme referred to the general theme of the ICHS „Science and Cultural Diversity" and was aimed at discussing how post-colonialism, international competition, globalisation etc. transformed chemistry and the chemical industry, particularly during the second half of the twentieth century. Special emphasis was given to the role of non-European and developing countries. Special features included: assimilation, innovation and cultural identity; science and technology transfer; political and legal aspects of global science; pollution control and national interest; globalisation of research and development; high technologies vs. domestic technologies; information control and access to knowledge; transmission and transformation of institutional models. Ernst Homburg, Yasu Furukawa, and Christoph Meinel acted on the programme committee.

There were two sessions, one on Constructing the Infrastructure of Chemistry in Emerging Peripheries with emphasis on institutional, social and political aspects, the second From Natural Resources to National Chemical Technologies with emphasis on materials and technologies, oil-based in particular. The following papers were read: Yoshiyuki Kikuchi (Tokyo, Japan):„The Formation of Physical Chemistry in Japan at the Turn of the Century"; Nathan M. Brooks (Las Cruces, USA): „The Evolution of Chemistry in Russia and the Soviet Union, 1900-1953"; Elena Zaitseva (Moscow, Russia): „Catalytic Chemistry and Industry during the political transformation in Russia"; Ian D. Rae (Melbourne, Australia): „Chemistry in Australia: Growing Up, Down Under"; Gabor Pallò (Budapest, Hungary): „Shifting Centers and Emerging Peripheries"; Yasu Furukawa (Tokyo, Japan): „Silk, the 'Nylon Shock', and Polymer Research in Japan"; Dong-Won Kim (Taejon, Korea) and Geun Bae Kim (Chonju, Korea): „Two Chemists, Two Koreas: Science, Ideology, and Economic Development in 20th-century Korea"; Zhang Li (Beijing, China):„National Needs and Academic Research: The Case of Macromolecular Sci

ence in the Early People's Republic of China"; Nasir Tyabji (New Delhi, India) „Acquiring Know-Why vs. Licensed Manufacture: Penicillin in Nehru's India"; Hebe Vessuri (Caracas, Venezuela): „The Experience of Latin American Catalysis through the Ibero-American Catalysis Symposia".

A selection of papers from the Mexico Symposium are accepted for publication as a special issue of *Ambix: The Journal for the Society for the History of Alchemy and Chemistry*, scheduled to appear in 2005.

II.2. International Conference 2002 (Philadelphia)

A major international conference „Industrial-academic relationships in the Chemical and Molecular Sciences" was held at the Chemical Heritage Foundation in Philadelphia, USA, from 3 to 5 October 2002. It was the fourth in the series of international meetings focused on the history of 20th-century chemistry organised by the CHMC. The academic programme was put together by an organising committee consisting of Leo Slater, David Brock, Harm Schröter and Christian Simon. The conference was co-sponsored by the Chemical Heritage Foundation and the Dibner Fund.

The conference was internationally advertised in advance in chemical and history of science newsletters/journals, by e-mail and by direct mailing to some 2000 addresses. 25 speakers/commentators were invited, the total audience was about 50 people. The invited participants came from China, France, Germany (2), India, Italy, Japan, The Netherlands, Norway, Spain, Sweden, Switzerland (2), United Kingdom, USA (10), and Venezuela. A special feature of the conference was that we had two distinguished commentators for each thematic group who introduced the discussion.

The following papers were presented: David Hounshell (Carnegie Mellon University): "Industrial-academic relationships in the chemical sciences"; Arthur Daemmrich (Chemical Heritage Foundation): "Cross-Cultural Technology Transfer: From the Laboratory to Mass Production in the Early Antibiotic Era"; Renato Giannetti (Università di Firenze): "Integrative Capabilities" in the Contemporary Pharmaceutical Industry: A Case Study from the Treatment of Osteoporosis"; Núria Puig (Universidad Complutense de Madrid): "Industry and Academia in the European Periphery: Adapting Foreign Technology for Spanish Chemical and Pharmaceutical Companies"; Leo Slater (Johns Hopkins University): "The Chemical Control of Malaria: Chemotherapy and Cooperative Research"; Nathan Brooks (New Mexico State University): "The Formation of the Soviet System of Chemical Research and Development"; Jeffrey Johnson (Villanova University): "Academic-Industrial Relations and Chemical Education in Germany, 1919-1939"; Zhang Li (Chinese Academy of Sciences): "The Scientific Layout of the Socialist State: A Case Study of the founding of the Research Institute of Chemistry under the Chinese Academy of Sciences"; Nasir Tyabji (Jawaharlal Nehru University): "Exemplar of Academia-Industry Interchange: The Department of Chemical Technology at Bombay University"; Carsten Reinhardt (Universität Regensburg): "The Instrument and Organic Chemistry: A Dynamic Approach to the Triangle of Manufacturers, Users, and Sponsors"; Sven Widmalm (Uppsala Universitet): "The Svedberg, the Ultracentrifuge, and the Role of Science in Industry"; Prakash Kumar (Georgia Institute of Technology): "Contesting Scientific "Facts": The Perspectives of Indigo Planters, Dyers, and Traders"; Meng Li (Japan Advanced Institute of Science and Technology): "Learning by Technology Import, Accumulation, and Path Dependence: An Historical Survey of Japanese Polymer-based Industries, 1953-1973"; Hebe Vessuri (Instituto Venezolano de Investigaciones Cientificas): "World Class Industry in an Underdeveloped National Innovation Context: The Case of the Venezuelan Oil Industry and Academic Research"; John Ceccatti (Universität Basel): "Industrial Research Agendas in Environmentally Sensitive Fields: The Case of Insect Resistance Research"; Susan Becker (BASF Aktiengesellschaft): "Mediating Know-how: Polymer Science and Technology at BASF".

A selection of papers from the 2002 Philadelphia Conference was published in: Carsten Reinhardt, Harm G. Schröter (eds.), *Academia and Industry in Chemistry: The Impact of State Interventions, and the Effects of Cultural Values*, Ambix 51/2, special issue (2004), pp. 99-186.

II.3. Symposium 2003 (Budapest)

In 2003, CHMC did not organise a conference of its own, but decided instead to organise a special session on "Research schools and communication in 20th-century chemistry" at the Fourth International Conference on History of Chemistry held in Budapest, Hungary, from 3–7 September 2003. This conference was one in a well-established series of meetings, and by joining it CHMC wanted to extend its visibility. The conference was co-organised by the Federation of European Chemical Societies and the Hungarian Chemical Society. The general theme was "Communication in Chemistry in Europe ".

CHMC Board members Hendrik Deelstra (Belgium), Gabor Pallo (Hungary), Carsten Reinhardt and Christoph Meinel (Germany) were members of the Programme Committee, Ernst Homburg (Netherlands) its chairman. CHMC Board members Ernst Homburg (Netherlands), Hendrik Deelstra (Belgium), Jeffrey Johnson (USA), Gábor Palló (Hungary) and Mary Jo Nye (USA) gave research papers during the conference.

The conference was divided into the following sessions: 1. Travels, letters, and laboratories; 2. Communication in chemical technology; 3. Research schools and communication in physical chemistry; 4. Schools and communication in chemical science; 5. Communicating the history of chemistry today; 6. Journals in chemistry, their impact and their problems; 7. Schools in 20th-century biochemistry. The key note opening address was delivered by corporate historian Prof. David Hounshell of Carnegie Mellon University.

The proceedings are going to be published by the Hungarian Chemical Society.

II.4. International Conference 2004 (Paris)

From September 17-18, 2004, the Commission held the Fourth International CHMC Conference on the topic "The Public Image of Chemistry". The conference took place in the Cité des Sciences et de l'Industrie La Villette and in the Maison de la Chimie, Paris (France). The programme committee consisted of Bernadette Bensaude-Vincent (Université Paris X, France), John Van Ness (Chemical Heritage Foundation, Philadelphia, USA), Gérard Emptoz (Université de Nantes, France), Joachim Schummer (Universität Karlsruhe, Germany, and South Carolina University, USA), and Brigitte van Tiggelen (Mémosciences, Louvain-la Neuve, Belgium). Members of the Local Organising Committee were Fred Aftalion (Maison de la chimie, Paris), Bernadette Bensaude-Vincent (Université Paris X), Pietro Corsi (CRHST, Paris), Gérard Emptoz (Université de Nantes), and Brigitte Van Tiggelen (Louvain-la Neuve).

The conference received financial and/or organisational support by a number of French and international organisations, such as: Chemical Heritage Foundation, Philadelphia, USA; Centre de recherche en histoire des sciences et des techniques (Cité des sciences et de l'industrie); Centre d'histoire et de philosophie des sciences, Université de Paris X – Nanterre); Hyle; Mémosciences, Belgique; Union des industries chimiques. Other donations came from the Commission Chimie et Société; Société de Chimie Industrielle; Société française de chimie; CNRS Service des Archives; CEFIC, Brussels. Industrial sponsors were Saint-Gobain, SNPE, Atofina, Dupont, Solvay France, BASF.

The total budget of the conference was Euro 13.950; this does not include travel expenses paid by the speakers' institutions, most notably by Chemical Heritage Foundation (USA). During the preparations, fundraising proved to be more difficult than expected (as documented by the number of supporting bodies mentioned above), but in all cases the initial DHS grant proved to be an important argument in all negotiations.

The purpose of the conference was to analyse the consequences of the major events that have affected the public perception of chemistry. In seven sessions the following topics were discussed: 1. Chemistry in literature, 2. chemistry in movies and popular culture, 3. chemistry in pictures and exhibitions, 4. chemistry in education, 5. the chemists' self-images, 6. popular science and corporate advertising, 7. public debates and public relations. The conference was extremely professionally organised. It was well attended and received considerable attention from science journalists representing French and British scientific and professional journals.

The following papers were presented: Alain Coine (Lyon, France) "The Chemical Horror Show: the Image of Chemistry emerging from an investigation amongst public opinion leaders in France"; Marc Devisscher (Brussels, Belgium) "Image of the European chemical industry 1992 - 2004, from bad to worse or maybe not?"; Roslynn D. Haynes (Sydney, Australia) "(Al)chemists in Fiction: The Master Narrative"; Philip Ball (London, UK) "Chemistry in XXth-century novels"; Peter Weingart (Bielefeld, Germany) "Chemists and Their Craft in Fiction Film"; Jeffrey L. Meikle (Austin, USA) "Material Doubts: The Popular Consequences of Plastic, 1945-2000"; Joachim Schummer (Columbia, USA) and Tami Spector (San Fransisco, USA) "The Visual Image of Chemistry and Chemists"; Robert D. Hicks (Philadelphia, USA) "Lessons Learned in Teaching the History of Modern Chemistry On-line"; R. Emmanuel Eastes (Paris, France, and Commission Chimie et Société) "From primary school to university: the main obstacles to the comprehension of chemistry"; Guy Ourrisson (Paris, Académie des Sciences)

"The "Appel de Paris" – Chemistry as viewed by other scientists"; Pierre Laszlo (France) "On the Self-Image of Chemists, 1950-2000"; Paul Caro (Académie des Technologies, France) "The chemist as an autodidact"; Robert Bud (London, UK) "Penicillin as a wonder drug: The construction of a public image and its collapse"; David Rhees (Minneapolis, USA) "From 'Merchants of Death' to 'Better Living Through Chemistry': The Case of Du Pont". The conference was closed by a Round Table : "Toward an Ethics of Chemistry", chaired by Bernadette Bensaude-Vincent (Univ. Paris-X Nanterre, France) and with Jean-Pierre Dupuy (Ecole Polytechnique, France, and Stanford University, USA), Andrée Marquet (Commission Chimie et société, France) and Herve This (Collège de France).

The conference was extremely well received by the media: Reports have appeared in, among others, *L'actualité chimique* (November/December 2004), *Chemistry World* (December 2004, see <http://www.rsc.org/chemistryworld/features/free/CW00412F0036.htm>), *Chimie Pharma Hebdo & Info Chimie* (December 2004), and even in *Nature* 433 (Ph. Ball, Jan 2005), p. 17. A selection of papers from the Paris Conference is currently being considered for publication as a special issue of *Hyle: International Journal for Philosophy of Chemistry*, ed. by Joachim Schummer, Bernadette Bensaude-Vincent and Brigitte Van Tiggelen.

II.5. Workshop 2005 (Jerusalem)

On April 14-15, 2005, the Sidney M. Edelstein Center for the History and Philosophy of Science, Technology, and Medicine of the Hebrew University, Jerusalem, hosted a special workshop on "COLOR: 20th-Century Business and Chemical Technology", organised by Anthony Travis (Jerusalem). Speakers included Tony Travis (Edelstein Center, Hebrew University): "The Mauve Celebrations of 1906 and 1956. What About 2006?"; Declan O'Reilly (Roehampton University, UK/Michigan State University): "Seize and Squander: IG Farben, GAF and Interhandel; Americanising the German Chemical Industry in the 20th Century"; David Genesove (Department of Economics, Hebrew University/Center for Economic Policy Research, London): "The Relative Persistence of Incumbency: The U.S. Dye Famine and its Aftermath"; Tony Travis (Edelstein Center, Hebrew University): "The United Colors of America: Germanising the American Chemical Industry in the 20th Century"; John E. Golub (AOM Technologies): "Organic Dyes as Key Enablers of Science and Technology since the Invention of the Laser".

The workshop was a simple but impressive example of how to organize an interdisciplinary seminar, bringing together historians, scientists, and economists with shared interests in synthetic dyes and the dye industry. The workshop was also intended as a prelude to the 150th anniversary in 2006 of the discovery of the first successful synthetic, or coal tar, dye, mauve.

II.6. Symposium 2005 (Beijing)

As usual, CHMC will organise a Symposium at the next International Congress of History of Science. The proposal for a Symposium on "Globalisation and Diversity: Modern Chemistry and Chemical Technology", to be part of the XXII. ICHS in Beijing, July 2005, was submitted to the ICHS organisers in Jun3 2004 and has been officially accepted as ICHS Symposium SC16. The panel of speakers was brought together by Yasu Furukawa (Fujisawa, Japan), Ernst Homburg (Maastricht, Netherlands), Zhang Li (Beijing, China), and Nasir Tyabji (New Delhi, India). The theme relates to the general theme of the XXII. ICHS „Globalisation and Diversity: Diffusion of Science and Technology throughout History" and is aimed at discussing a variety of topics relating to the general theme, including the transmission of chemical knowledge and chemical technologies; the globalisation of modern chemistry and chemical industry and its problems; and chemistry and chemical technologies in the colonial and the postcolonial context. The time period to be focused on is the 20th century. In particular, the conference will attempt to answer the following questions: How were chemical knowledge and chemical technologies transferred from one area to other countries? Did any models serve in this process? How were chemistry and chemical technologies developed in the context of colonial linkages? How were they transformed into the postcolonial world? What was the nature and outcome of globalisation of chemistry and chemical technology? Focussing on globalisation as well as knowledge and technology transfer, the symposium will be sort of follow-up meeting to the CHMC symposium "Emerging Peripheries and Shifting Centres" held during the XXI. International Congress of History of Science in Mexico City in 2001, and the presence of speakers from that earlier event will guarantee for a continuity of discussion. To make the conference more coherent, abstracts of all papers have been communicated to the speakers in advance, and the same will be done in June 2005 with the draft papers as soon as they are available.

The preliminary programme of Symposium SC16 contains the following contributions: *Session 1: Chemistry and Chemical Technologies in the Context of Colonial Linkages* (Chair: Ernst Homburg, University of Maastricht, Netherlands): Naoki Yamaguchi (Tokyo/Beijing): "Transmission of Chemical Technologies from Japan-occupied Manchuria to Post-war China"; Harro Maat (Wageningen, Netherlands): "Agricultural Sciences in Colonial and Post-colonial Indonesia"; Nathan M. Brooks (Las Cruces, USA): "The Development of the Soviet System of Chemical Research". *Session 2: Globalisation and Transfer of Modern Chemistry* (Chair: Yasu Furukawa, Fujisawa, Japan): Yoshiyuki Kikuchi (Milton Keynes, England): "The British Model of Chemical Education in Meiji Japan: Transfer and 'Acculturation'; He Juan (Beijing, China): "The Evolvement and Standardization of the Chinese Terms of Chemical Elements in the Early 20th Century"; Zhang Li (Beijing, China): "From the Soviet Union to the U.S.: International Exchange in China's Polymer Science"; Nasir Tyabji (New Delhi, India): "Globalization and Chemistry within the Council for Scientific and Industrial Research, 1945-2005"; E. Haribabu (Hyderabad, India): "Chemical Science and Biotechnology Interface: Antecedents and Consequences in the Era of Globalization".

III. Future Activities and Plans

III.1. Workshop on Chemical Experts

A Research Workshop on "Chemical Experts between Science, Government and the Public, 1850–2000", originally planned for June 2004, had to be postponed because of lack of funds and because the grant we received from DHS in 2004 had to be used in its entirety for the Paris conference. There is a chance, however, to re-schedule it for late 2005 or early 2006. A provisional programme and a list of potential speakers have been put up by Carsten Reinhardt (Regensburg, Germany).

Scientific experts represent a new type of professional roles in science. Their advice is often the basis for political and economic decisions. For several years the role and function of experts has been analysed from the point of view of political science and sociology. Historians of science have hardly touched the subject so far. The workshop will bring together historians of science and technology in order to discuss possible approaches and to create a framework for further research. The role of chemical experts (including toxicologist and ecologists) will form the focus of attention. The sessions will deal with the problem of political decision-making in knowledge-based societies, with ecological issues involving chemical knowledge, and with the creative role of experts for the development of science. The workshop is aimed at initiating a European research network on the topic of scientific expertise and expert cultures.

Potential participants include John Ceccatti and Arthur Daemmrich (Philadelphia), Ernst Homburg (Maastricht), Sean Johnston (Glasgow), Gabor Pallo (Budapest), Nuria Puig (Madrid), Xavier Roqué (Barcelona), Anthony S. Travis (Jerusalem), and Carsten Reinhardt (Regensburg).

III.2. Participation in other international conferences

CHMC board members will be involved as co-organisers and/or speakers in the following international conferences:

5th International Conference on the History of Chemistry: "Chemistry, Technology, and Society", Lisboa, Portugal, 6-9 September 2005, organised by the Working Party on the History of Chemistry of the European Association for Chemical and Molecular Sciences (EuCheMS);

Workshop on the History of Radioactivity and Nuclear Science, organised by Xavier Roqué, Centre d'Estudis d'Historia de les Ciències, Universitat Autònoma de Barcelona, Spain.

III.3. Proposals for future conferences

Topics for future conferences were proposed by Board members and discussed; details, however, need to be worked out. Suggested topics span from "Green Chemistry and the Second Agricultural Revolution", "Documentation in Chemistry" and "Chemical Engineering and Industrial Organisation" to "Environmental Chemistry". In addition, the idea of a summer school on the history and philosophy of modern chemistry was put forward.

IV. Publications

CHMC encourages the organisers of the respective conferences to publish the results. As a rule, however, there should be no automatic link between a conference and its publication; instead, the respective editors are free to select papers from those presented at the conference, and even to invite additional contributions in order to make the publication more balanced. In the past, CHMC conference proceedings were published either as separate books produced by major publishers, or as special issues of international journals; and the same publication policy will continue in order to increase CHMC's visibility for various audiences.

The following conference proceedings have been published or are scheduled for publication:

Munich Conference

Carsten Reinhardt (ed.), *Chemical Sciences in the Twentieth Century: Bridging Boundaries*; foreword by Roald Hoffman (Weinheim, New York, Singapore, Toronto: Wiley-VCH, 2001) xviii + 281 pp., ill., hardcover, ISBN 3-527-30271-9

Jerusalem Conference

Anthony S. Travis (ed.), *Forty Years since Silent Spring: Historical Perspectives on the Pollution of Water and Soil by Synthetic Chemicals, 1860–1960*, Special issue of: *Ambix: Journal of the Society for the History of Alchemy and Chemistry* 49 (2002), pp. 1–66.

London Conference

Peter J.T. Morris (ed.), *From Classical to Modern Chemistry: The Instrumental Revolution* (London: Royal Society of Chemistry; Science Museum, 2002) xxi + 347 pp., ill., hardcover, ISBN 0-85404-479-5

Philadelphia Conference

Carsten Reinhardt, Harm G. Schröter (eds.), *Academia and Industry in Chemistry: The Impact of State Interventions, and the Effects of Cultural Values*, Ambix 51/2, special issue (2004), pp. 99-186

Mexico Conference

Special Issue of *Ambix: Journal of the Society for the History of Alchemy and Chemistry*, to appear in 2005

Budapest Conference

A selection of papers from the conference will be published by the Hungarian Chemical Society; details are not yet available

Paris Conference

Considered for publication as a special issue of *Hyle: International Journal for Philosophy of Chemistry*

V. Budget

The following budget includes the turnover of the CHMC (Euro)-account kept at the University of Regensburg. Since all DHS grants were received in US-$, the survey budged is given in that currency and does not take bank charges into consideration. In the future, DHS might be able to save a certain amount of money, for if one of its accounts were run in Euros, transfers within Euroland would be free of charge.

For the following budget grants and subsidies from other sources, that went into the respective conference budgets, are not accounted for since these budgets were managed by the respective local organisers and not via the CHMC account. Likewise, the budget does not include travel expenses paid by the home institutions of speakers attending the conferences. In all cases the DHS grant was but a minor part of the total costs of the conferences (average between 15.000 and 25.000 $); nevertheless, it was extremely valuable, not to say instrumental, in soliciting other major sponsors and funding institutions.

CHMC Budget 2001–2005

Income	*DHS grant*	*used for* *(all amounts in US-$)*
2001	350	running costs
2002	350	running costs
	1000	Philadelphia conference
2003	300	running costs
	1000	Budapest conference
2004	300	running costs
	1000	Paris conference
2005	300	running costs
	550	(to be used for workshop on experts)

VI. Conclusion

During the past four years, driven by the enthusiasm of its members, encouraged and supported by several organisations and institutions all over the world, and with but modest financial input from DHS, CHMC has achieved to built up an efficient network of historians of modern and contemporary chemistry. Seven years after its creation CHMC can boast of a record of conferences and publications that makes us confident that DHS Council and General Assembly will approve our work and will extend our mission as one of the Scientific Commissions of DHS for another four years.

Regensburg, April 19, 2005

Christoph Meinel
CHMC President

Appendix: Reports on the two most recent CHMC Conferences (2004 and 2005)

1. Paris Conference 2004

The changing image of chemistry, by Vikki Allen

from: Chemistry World 1/12 (December 2004) <http://www.rsc.org/chemistryworld/features/free/CW00412F0036.htm>

Chances are if you are reading this article then you are boring, eccentric and socially awkward.This is apparently what school children think, according to recent studies. Children, as young as eight years old, already have strong preconceptions about what it means to be a chemist.

A poor start, so it seems, for chemistry as a discipline, but Cefic (the European Chemical Industry Council) says the future is looking up for the chemical industry.

For most people, the results of the studies into children's opinions of chemists will be unsurprising. We are all too familiar with the stereotype of a chemist based around a 'nerd' in white coat. But children also said they were afraid that by becoming a chemist they risked injuring themselves or others.

They also said they did not want to work in what they saw as an isolated environment. Their parents agreed, saying, that although they thought chemistry may be a good career, it would not suit their child as he/she prefers to work as part of a group. As chemists we are able to treat these stereotypes for what they are, but still such generalisations endure.

This negative image may finally be improving. The results of Cefic's 2004 pan-European survey of the industry's image show 48 per cent of the population has a positive attitude towards the chemical industry while 44 per cent has a negative one. This outcome marks a gradual positive shift in the public's attitude towards the chemical industry; an attitude that has not been favourable for well over a decade.

- *Opinions vary*

Delegates at the Public images of chemistry in the 20th century conference, held in Paris, France, in September, learned also that European opinions of the industry vary widely from country to country, according to the Cefic survey. The industry in Germany has mostly maintained a positive reputation with more than 60 per cent support. Conversely, at the bottom of the table the Swedes show little support for the industry.

There appears to be some logic for the variations. Germany is one of the largest employers within the chemical sector and Sweden one of the smallest. It appears that the more people who work in an industry, the greater the public understanding of the work and the surrounding issues, and the more likely the local public is to support your work. In short, better public relations. Also, the numbers of German undergraduate students opting to study chemistry is increasing.

- *Medieval perceptions*

But how did the negative image come about? The term alchemy originally referred to an ancient art of spiritual purification and transformation; a way for people to connect with the divine spirits. Although the origins of alchemy vary across the world, in the middle-ages the term became associated with man's desire to harness nature. Alchemists would strive to turn lead into gold and to produce the elusive 'elixir of youth'.

The alchemist's profession was a mystery and the public viewed it with a mixture of fear and wonder. The alchemical symbols used at the time were unrecognisable to outsiders and the church discredited the work. But the force of human nature meant the public still wanted what the alchemists were working towards; endless riches and eternal life.

The middle-ages also saw the rise of one of the most recognisable symbols of chemistry – the 'gazed-at' flask. This image is now common in chemical company brochures. It is used relentlessly in advertisements and today the gazed-at flask presents an immediately recognisable picture of 'the chemist'.

The roots of this image do not lie in chemistry. As early as the 13th century, the 'gazed-at' flask was an emblem of medicine, and often depicted the technique of uroscopy, explained Joachim Schummer of the philosophy department, University of South Carolina, US and the Technical University of Darmstadt, Germany, and Tami Spector of the chemistry department at the University of San Francisco, US. However, with increased understanding of the molecular science behind medicine, this ubiquitous motif slowly transferred to alchemy and on to chemistry.

Moreover, it has been shown that laboratory glassware images have become so entwined with chemistry's visual culture, that when we see flasks and beakers they are used to illustrate chemistry, rather than any other scientific discipline, in almost 80 per cent of cases.

In the modern era the changes in the public image of chemistry have been considerable. Back in the 1930s, chemistry was a noble profession; you could stand tall as a scientist. Broad spectrum antibiotics – sulphonamides and penicillin – became freely available and were heralded as the new wonder drugs that would cure all ills. The future looked bright and other areas of chemistry were making some significant advances; although brittle bakelite switches and kitchen utensils that melted to the bottom of pans were not quite so welcome.

Following the second world war, steady progress was made within the industry until the positive image suddenly collapsed. Drugs that were supposed to solve problems began to be the cause of them. Antibiotic-resistant strains of bacteria started to emerge and thousands of children were affected when their mothers were prescribed thalidomide in pregnancy. Repurcusions from these problems are a permanent reminder there is still a lot to learn.

During the 1970s global pollution rose up the agenda. The chemical industry was forced, quite literally, to clean up its act and research began in earnest to find workable alternative energy sources.

In spite of the chemical industry's failings, there were also significant technological and medical achievements, but the public had lost faith in the industry. In the 1980s significant progress continued to be made, for example in nanotechnology, but somehow the reputation of chemists and the industry did not recover.

Robert Hicks, acting director of the Beckman Center for the History of Chemistry at the Chemical Heritage Foundation, Philadelphia, US, believes that the negativity surrounding chemistry emerged during the first world war. He believes the terrifying images of people suffering from the effects of mustard and chlorine gas attacks left an indelible picture on people's minds.

Hicks feels that it will take a lot of time and effort to overcome some of the most negative images, saying that 'if chemists can turn air into a lethal gas, that is, changing an invisible substance necessary for life into an invisible substance antithetical to life, then, in the public mind, chemists can inflict disaster at will'.

- *The way forward*

The tainted image of the chemical industry persists, so how can the industry and chemists move forward? Many people believe the answer lies in good communication and education. Now is time for chemists to capitalise on Cefic's survey results stating that chemistry has a positive image.

Perhaps part of the solution to problem of image lies in the history of chemistry and the underlying idea that if people better understand the successes and failures of the past, then they will embrace new ideas but not necessarily expect a perfect outcome or miracle cures. Many people now feel that the answer lies in how chemists present themselves in public, particularly when dealing with the media.

- *Image change*

Through the eyes of the media, the public image of the chemical industry has been overhauled during the past 30–50 years. Few other industries have undergone such a dramatic public image change. But are these changes real or do they simply reflect improved marketing?

People who work, or have worked, as part of the chemical industry may attribute the main changes to advances in technology and increased health and safety awareness and legislation.

The public has also seen an equally dramatic change. Those born into Generation X, or before, will remember the old image of the chemical industry; a time before global warming and widespread pollution became both a public and political priority. A time when business in the developed world was booming and provided well paid employment.

During the 1960s and early 1970s images of the industry as a very powerful machine were promoted. High productivity, accompanying the tall chimneys belching smoke and miles of shiny pipes were publicised. This image changed starkly with the increased awareness of environmental concerns.

Today, a chemical company's website will promote images of new, clean office blocks nestled discreetly between trees. So, where did all the chimneys go? The public fears they have been hidden from us, and that they are still there. The assumption being, that if companies are so good at hiding the pipes, then what else might they be hiding?

- *Promoting chemistry*

Currently, the disparity between public perception and reality is too large. So, should the industry as a whole be more transparent as sometimes suggested? There is a risk in this type of approach that it will incite further criticism or confuse the public with complex, specialised areas of chemistry.

But much can be done to promote chemistry. Many organisations hold open days or work to improve links with schools and provide educational materials. For instance events in the UK, such as the Christmas lectures hosted by the Royal Institution, are used to capture children's imaginations and stimulate an interest in science. These lectures help to put complex scientific issues across in an entertaining manner so that they may become more interested in scientific concepts early on.

Although it has been suggested that the image of chemistry would do better if it could be detached from that of the industry, maybe it is time to stand up for ourselves. Perhaps if industry representatives were to promote the good and acknowledge the bad then a more representative reputation could be earned.

The cause has its believers, those prepared to stand up and be proud of chemistry and its heritage. Arnold Thackeray, president of the Chemical Heritage Foundation, is one such person. 'We have a story to tell. A story rich in progress and we have the privilege to tell and show this story.' he enthuses.

2. Jerusalem Workshop 2005

WORKSHOP REPORT: COLOR: 20th-Century Business and Chemical Technology, Edelstein Center, Hebrew University, Jerusalem, by Anthony S. Travis

On April 14, 2005, the Sidney M. Edelstein Center for the History and Philosophy of Science, Technology and Medicine at The Hebrew University of Jerusalem and The Commission on the History of Modern Chemistry held a joint workshop on COLOR: 20th-Century Business and Chemical Technology at the Sidney M. Edelstein Library, the Jewish National and University Library, Jerusalem. The workshop was a simple but impressive example of how to organize an interdisciplinary seminar, bringing together historians, scientists, and economists with shared interests in synthetic dyes and the dye industry. Spread over an afternoon and early evening, the five papers included the history of the dye industry in Germany, Britain and America, the economics of the U.S. dye famine during World War I, and the use of synthetic dyes as agents of transmission in laser technology for enhancing the accuracy of physical measuring techniques. The Edelstein Library was a highly appropriate setting, since the display of several rare books and journals brought to life many of the historical episodes described by the speakers.

The workshop was also intended as a prelude to the 150th anniversary in 2006 of the discovery of the first successful synthetic, or coal tar, dye, mauve. Tony Travis, deputy director of the Edelstein Center, opened the proceedings by drawing attention to the 50th and 100th anniversary celebrations, respectively, in 1906 and 1956 that marked the discovery by the teenaged William Henry Perkin in London of mauve. Its commercialization, based on coal tar, the waste of coal gas works, heralded the foundation of the first high-tech industry. Technology drove scientific developments, in this case in aromatic organic chemistry; by the late 1860s science was repaying its debt with the synthesis of the alizarin, the colorant of the important natural dye obtained from the root of the madder plant. From 1897, the German dye industry was producing synthetic indigo. While the principal 1906 celebrations were held in London, the 1956 celebrations were dominated by events held on a grand scale at the Waldorf Astoria Hotel in New York, since at that time the United States was the principal manufacturer of synthetic dyes and of the many

products, particularly pharmaceuticals, that arose from research into dyes and their intermediates.

Travis explained that the minimal interest so far in marking the 150th anniversary of mauve in 2006 is partly explained by the fact that the dye-making industry is now considered low-tech, polluting, and the source of cancer-causing chemicals. He gave as an example the panic in Britain and other parts of Europe during February 2005 when it was discovered that the red dye Sudan 1, used for coloring solvents and waxes, and a probable carcinogen to humans, had found its way into over 500 food products. Original publications by cancer pioneer Isaac Berenblum, held with the Regina Schoental Archive at the Edelstein Center, were circulated to show that this was a matter of considerable concern even in the 1930s, and the interest, particularly in bladder cancer caused by beta-naphthylamine, led to important developments in the understanding of cancer etiology. Significantly, the major European and U.S. dye-making firms have turned to pharmaceuticals and the life sciences, and nowadays tend play down their heritages in the colorants industry.

Travis then delineated the development of synthetic dyes until 1914, when Germany was the world leader, and BASF the largest chemical corporation, mainly due to the efforts of colorist-chemist Heinrich Caro. When in 1883 Adolf Baeyer at Munich drew the almost correct structure for indigo, in an era far removed from the laboratory hardware and software now available for visualizing structures, he owed much of this tremendous achievement to joint industrial-academic collaboration with Caro, the benzene ring theory, and test tube reactions. This work contributed to Baeyer's Nobel Prize in 1905. German ascendancy based on mastery of organic chemistry, mainly at BASF, Bayer, and Hoechst, was noted, sometimes with concern, elsewhere. Since the mid-1880s, the British chemist Raphael Meldola had warned his fellow countrymen of the dire consequences of losing the dye industry, but dye users cared little, as they were interested in obtaining the best quality dyes at the lowest price, which were those of German make. The outcome was that in 1914 Britain found itself short of the dye intermediates that were now strategic chemicals used for coloration of military uniforms and, more importantly, making explosives. This was also a matter of considerable alarm in the United States, whose less-studied synthetic dye industry dominated the three following lectures.

Declan O'Reilly, Edelstein Center Senior Fellow, and Travis presented papers that analysed the interrelations between the German and American chemical industries after 1914. O'Reilly presented a detailed exposition based on unpublished research concerning an important episode in the history of the international synthetic dye industry. He discussed the relationship between the German behemoth I. G. Farben, founded in 1925, and its American offshoot, General Aniline and Film (GAF), a major manufacturer of vat and azo dyes that was sequestered during 1942 by the U.S. government, and released from government control only in 1965 during the Kennedy administration. I.G. Farben was created in the mid-1920s from the leading German chemical companies, BASF, Bayer, and Hoechst, who had seen their assets in the rest of Europe and the United States seized as enemy property in World War I. This property, which comprised production plant, patents and bonds, had been sold to American interests including Grasselli Company. The German chemical industry, because of its unrivalled technical skill, was able to reassert its leadership in the United States and by the late 1920s had been able to reacquire much of the property that had been lost in 1918. Fearful of more complicated tax regimes across the world after 1918 and determined that its foreign property would never again be vulnerable to enemy seizure, I.G. Farben created a series of holding and subsidiary companies across the world. Starting in Switzerland in 1928 it founded I.G. Chemie. The following year Farben inaugurated the American I.G. Chemical Corporation in New York and title to its newly recovered production plant, the General Aniline Works, formerly belonging to Grasselli, was lodged with the New York firm. In both cases the impetus was to gain access to larger foreign capital markets than were available in Germany and at the same time dramatically reduce I.G. Farben's domestic tax liabilities. This was immensely successful and large sums were raised from bonds and share issues in both countries. As an added 'sweetener' to attract Swiss investors I.G. Farben offered a dividend guarantee equal to the German firm's own dividend. I.G. Farben also obtained from the Swiss firm a promise that it could acquire I.G. Chemie's holdings at book value. The important thing is that these actions were open to public inspection and widely approved. The shares of the American I.G. Chemical corporation were sold to I.G. Chemie in Switzerland and the proceeds of the American bond issue were divided between I.G. Farben in Germany and a large portfolio of stocks in prominent U.S. corporations.

However, what had been an open relationship in the 1920s became more complicated with the advent of the Third Reich. As war became certain so the American government began to divine a sinister aspect to this relationship and in 1942 the U.S. Treasury was instrumental in vesting the newly renamed General Aniline & Film Corporation, which by now had extended its activities to a wide range of chemical goods including photography and fine chemicals. As early as 1937 the new Securities and Exchange Commission was enquiring about the exact relationship between the American I.G. Chemical Corporation and its Swiss parent. No adequate explanation had been forthcoming and this underpinned the Treasury's belief that I.G. Chemie was merely a cloak for I.G. Farben interests. In fact I.G. Chemie had been pressuring I.G Farben in Germany to end both the dividend and option contract, on the grounds that Nazi currency control rendered them impossible to enforce. Reluctantly, and only after the start of the European war in 1939, did I.G. Farben agree. In 1942 after the seizure of GAF by the U.S. government I.G. Chemie lodged a formal complaint that its property had been sequestered wrongly because it was not an enemy nation but a friendly neutral. Under the Trading with the Enemy Act, which authorised seizure, and a provision of the Fifth Amendment to the United States Constitution which forbids the sale of confiscated property without access to legal redress during peace time, I.G. Chemie was entitled to sue the U.S. Government for restitution of GAF.

This was the crux of the argument: Was the separation between I.G. Farben and I.G Chemie genuine and therefore were the Swiss entitled to restitution of GAF, or was it part of a grand conspiracy to 'cloak German domination and control' of valuable international assets? The United States was never able to find the one document that proved this contention, despite capturing vast amounts of I.G. Farben's documents and imprisoning its directors. These men were put on trial by the International Military Tribunal in 1947 and many were found guilty of crimes against humanity for having employed slave labour in I.G. Farben's plant located at Monowitz, near the Auschwitz concentration camp.

The American attitude to GAF was simple; it had been legally seized and needed to be kept in American ownership for reasons of national security. Moreover, compensation could only be paid to any litigant if it could be proved prove they were not a cloak for German interests.

The legal deadlock between the United States and I.G. Chemie ultimately came to favour the Swiss because as the cold war progressed so the emotiveness of I.G. Farben's crimes became less, and Switzerland was able to force hearings at both the U.S. Supreme Court and at the International Court at the Hague. In both cases the courts

recommended that the litigants seek redress in lower courts in the United States, or alternatively reach some sort of settlement. In the early 1960s, the Kennedy administration, mindful of the old adage that a bad settlement was better than a bad trial came to an agreement with the new owners of I.G Chemie, the Union Bank of Switzerland. The UBS, under its dynamic director Alfred Schaefer, was untainted by any association with I.G. Farben and was a reasonable partner for the United States to deal with. After much negotiation it was agreed that I.G. Chemie would be compensated with approximately one third of the prospective sale price. GAF was auctioned in 1965 by the American Government under a system of sealed bids. Despite much criticism of the sale, it satisfied two important imperatives: first, American desire to nationalise an important company that had national security implications; and second that the largest part of the proceeds would go to the United States, which would then be used to compensate American victims of World War II who had lost property overseas. These aims were achieved and of a sale price of $330 million over $200 million went to the United States.

A different approach to the 20th-century U.S. dye industry was taken by Travis who discussed his recently published work to show how some American entrepreneurs reacted to the dye shortage created in 1914 by the British blockade of German shipping. The starting point for the Calco Chemical Company, at Bound Brook, New Jersey, was a mix of German textbooks, American academic consultants, and trial-and-error. Later there was access to German patents through the Chemical Foundation. In 1927, further emulating the German way of doing things, Calco opened a dedicated research laboratory. Two years later it was absorbed by American Cyanamid, and in the 1930s diversified into sulfa drugs based on dye intermediates, the development of instrumentation, often in collaboration with Perkin-Elmer, and aminoplastics, particularly melamine. The latter products were technological achievements since they made available the first colored plastics. America had caught up with, and in many sectors, overtaken Germany. The problem of dye shortages in the United States, and American backwardness, as exemplified by the response of Calco, neatly brought the audience to the third paper in which David Genesove of the Hebrew University's Department of Economics and the Centre for Economic Policy Research, London, examined how technology transfer in advanced industrial sectors takes place between economies with divergent industrial skills and experiences, a topic of considerable interest to historians and economists. Genesove outlined an innovative economic model to explain the cost-benefit of hot-housing a new technology with only limited technical experience. The sudden and almost total loss of vital dye imports, previously only available from Germany, due to the British blockade in World War I, forced American industry to expand its domestic production from a very limited technical base. The 'dye famine' of 1914 offers an interesting opportunity to examine this model, by using American firms' entry into the dye industry to infer the speed by which lagging firms are able to copy an innovators product. The American firms produced much more of the older dyes than the newer ones. The degree by which they favored the older dyes, coupled with the degree to which they produced more profitable dyes (proxied by 1914 dye imports), implies that the expected cost of copying a German dye was 16% lower for each extra year from the dye's 'initial' discovery. This analysis shows that more complex dyes were less likely to be produced.

In the final talk, John E. Golub of AOM Technologies described a recent episode in the history of synthetic dyestuffs following the invention of the laser: their uses as key enablers of science and technology. In 1966 Peter P. Sorokin discovered that organic dyes could form the basis of an optical laser. The outcome was that for nearly three decades organic dye lasers held sway as the only continuously tunable laser source. During that time, a generation of scientists forged a chain that reached: from organic dye material to dye laser light source; to novel spectroscopic measurement techniques; and, finally, to new scientific results. Nobel prizes in physics and chemistry were just some of the recognition this body of work received. The most important dye laser was Rhodamine 6G, a bright orange dye used to generate laser light in the orange and red portions of the spectrum. Rh6G-based lasers led to fundamental tests of quantum electrodynamics at the level of 1 part in 1014. Also, the world record for short pulse generation was held for about twenty years by a Rh6G-based laser. Within a few years of Sorokin's discovery organic dyes were available to laser scientists for most colors. This fast cycle is undoubtedly due to the fact that the dyes were not discovered so much as rediscovered. The laser physics community benefited greatly from the 150-year history of the rhodamines, coumarins, stilbenes, and other organic dyes.