

**IUPAC**  
**Division VI Division of Chemistry and the Environment (DCE)**

**Report to Council, Ottawa General Assembly 2003**

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**I. Executive Summary**

**Projects**

Following the strategic objectives of the Division its projects and further activities are targeted to provide authoritative information and judgements on any issues of chemicals in the environment. The major part of the projects is directly customer oriented dealing with actual problems of several branches of industry and of international environmental and human health protection organisations and agencies. The second area of activities is on communicating advanced concepts and state of the art assessments by extension workshops and conferences between scientists, especially in developing countries.

Consequently, the DCE strategy for new project is to further enhance customer orientation by consistently involving the parties interested in the work already in the project development and by reacting proactively to issues raised by society within the mandate of the Division. Thus, dissemination of the outcome of the Division's projects is not only through the traditional scientific channels but also by direct transfer. This ensures optimal use of the work of our experts, gives them status and motivation.

In the reporting period 10 projects were completed or terminated and 6 new projects were launched.

**Cooperation with other International Organisations**

There is successful cooperation on a project basis (state of the art and workshop) and through eminent Division and sub-committees members with scientific organisations and customers. These include IOCD, WHO, Codex Alimentarius (FAO/WHO), the EU Commission, to give only a few prominent examples. In addition, there is a long-standing cooperation with ICSU/SCOPE and SCOR due to the partial overlap of interests. Activities have been initiated to increase this type of cooperation with OECD, IFCS and with industry via ICCA.

An extraordinary large project initiated by DCE is "Environmental Implications of Endocrine Disrupting Chemicals". This is a joint IUPAC/SCOPE project, sponsored and co-financed

additionally by industry and several further national and international organisations. Cooperation with OECD is at present mainly on Green Chemistry within the joint sub-committee with Division III. However the successful case-by-case interactions will be expanded and intensified as needed.

### **Interdivisional Cooperation**

Apart from the green chemistry activities with Division III there is still insufficient interdivisional cooperation. The difficulties in expanding inter-divisional work largely relate to different approaches and concepts of work, not in a lack of interest on either side.

## II. ACHIEVEMENTS

The achievements of DCE in the reporting period are provided under the headings of the set of Long-range Goals established by IUPAC in 2000.

### **2.1 IUPAC will provide leadership as a worldwide scientific organization that objectively addresses global issues involving the chemical sciences.**

DCE was central to the organisation and promotion of two major international congresses held in 2002 that have been very influential in, even central to, two important global areas of chemistry: endocrine active substances and pesticide chemistry.

SCOPE/IUPAC Symposium. *Environmental implications of endocrine active substances: Present state-of-the-art and future research needs.* 17-21 November 2002, Yokohama, Japan.

This high-profile symposium was organised in Japan by a committee chaired by Dr Junshi Miyamoto (Past President DCE). The success of the symposium was Dr. Miyamoto's final accomplishment in a distinguished scientific career before his untimely death in April 2003. DCE was closely involved in the organisation, particularly with Topic-2 "Environmental Fate and Metabolism of Endocrine Active Substances" where DCE members contributed 5 of the 10 plenary papers. A set of 8 recommendations was developed for environmental risk management of EASs. The symposium reviewed many other lines of research and reached conclusions and recommendations that are contributing to resolving the significance of EASs to human health and the environment. The full proceedings will be published in 2 volumes of PAC during 2003. The executive summary with the major conclusions and recommendations will be widely distributed to reach any organisation involved in the issue. This timely and authoritative project brings great credit to IUPAC.

*10th IUPAC International Congress on the Chemistry of Crop Protection.*

4-8 August 2002, Basel, Switzerland.

Formerly the International Congress of Pesticide Chemistry, IUPAC/DCE has had a central role in sponsoring and co-organizing this series of meetings held since 1968. DCE was represented via membership on both the Advisory Committee and the Scientific Program Committee for the Basel congress. DCE members were also chairs of many of the plenary sessions and workshops, as well as co-organizers for a number of the poster sessions. Several recently completed and ongoing IUPAC-funded projects were highlighted through the plenary sessions and workshops. Scientists from 56 countries participated in the Congress, which drew more than 1300 attendees. The Congress proceedings were published during December, 2003 via Springer-Verlag. The 11th Congress is currently being planned for Kobe, Japan during 2006.

In the food area, the XI International IUPAC Symposium on Mycotoxins and Phycotoxins is being organised for 17-21 May 2004, Bethesda, USA. This is the eminent international meeting on the chemistry of natural toxins and DCE maintains its strong involvement in the scientific programme (see below for proceedings of the Xth symposium).

DCE also has a tradition of supporting regional workshops on particular applied chemistry issues and two significant events were organised during the reporting period:

*Local and Regional Contributions to Air Pollution in Asian Developing Countries* was held 17-20 September, 2001, Guangzhou, China. DCE sponsored this workshop which was chaired by Dr Yuanhang Zhou. It brought together international experts from the Division and local scientists

to a forum that addressed some of the core chemical issues for the pressing problems of air quality in this rapidly developing region.

DCE has sponsored regional workshops on pesticide issues at regularly since 1988. *IUPAC/Korean Society of Pesticide Science Workshop on Pesticides*, Seoul, Korea, 13-16 October 2003 has the theme "Harmonization of Data Requirements and Evaluation", and is being co-organized with the Korean Society of Pesticide Science as well as several other Korean scientific societies and Crop Life Asia. Major topics at the meeting will include pesticide regulation, residue analysis and monitoring, establishment of MRLs, and risk assessment/management with particular highlights from recent IUPAC projects. Participation of approximately 200 is anticipated for federal and state regulatory officials, agrochemical industry representatives, academic researchers, and environmentalists (Workshop website: [www.IUPAC-KSPS.org](http://www.IUPAC-KSPS.org)).

A major new project "*Impact of transgenic crops on the use of agrochemicals and the environment*" was approved in January 2003 (leaders Gijs Kleter and Harry Kuiper). This topic area is of the utmost interest with respect to current scientific, regulatory, political and public perception issues surrounding transgenics and provides an opportunity for IUPAC to take important leadership roles in promoting the importance of chemistry in molecular biology.

## **2.2 IUPAC will facilitate the advancement of research in the chemical sciences through the tools that it provides for international standardization and scientific discussion.**

Projects completed in the reporting period that made significant contributions to this goal include:

*Physicochemical kinetics and transport at chemical-biological interfaces (610/42/97)*. In-press as No.9 in the Wiley book series on fundamental physico-chemical processes. Authoritative reviews by the task group provide a basis for understanding chemical flows between the living and inert components of the environment.

*Minimum requirements for reporting analytical data from environmental samples (630/18/93)*. This project led by Dr Hans Egli is ensuring that data on environmental chemistry is reported internationally in a consistent fashion and with adequate detail to ensure comparability of datasets.

*Pesticide residues in food – acute dietary exposure (1999-009-1-600)*. This project follows the influential DCE report on establishing safe limits for pesticide residues in food based on chronic exposure. Acute exposures are a contentious issue and the final report will be influential in international forums such as CODEX.

*Regulatory limits for pesticide residues in water (1999-017-1-600)*. Task group chairman Denis Hamilton. This project has made recommendations that are of great value to the harmonisation of water quality standards and these have been presented to various relevant international groups (Codex, JMPR).

## **2.3 IUPAC will assist chemistry-related industry in its contribution to sustainable development, wealth creation, and improvement in the quality of life.**

The IUPAC/SCOPE symposium on endocrine active substances and the 10<sup>th</sup> IUPAC congress on crop protection chemistry (see 2.1 above) have been very influential in meeting this goal with respect to two classes of chemicals where there is a very high degree of public and scientific interest in their environmental properties and potential risks.

DCE has maintained an interest in the Green Chemistry area, although direct contributions to related inter-divisional projects remain modest

#### **2.4 IUPAC will foster communication among individual chemists and scientific organizations, with special emphasis on the needs of chemists in developing countries.**

DCE has a policy of initiating and organising extension workshops, preferably in developing countries, aiming at up-to-dating scientists in the region on topics relevant to regional needs and aligned to the Division's work on food and environmental issues. These workshops have been mostly organised in collaboration with other international scientific organisations or other relevant partners, including customers of the products such as industry. There has been less activity in the present biennium than in the past, but the two workshops in China and Korea (see 2.1 above) are still very important extension activities for DCE. An international workshop on Fats and Oils is being organised for Morocco in 2004.

The success of these workshops requires significant funding and other inputs from IUPAC and partner organisations. DCE has been prepared to commit a significant proportion of its discretionary funding to these important activities. The workshops develop substantial exposure and credit to IUPAC, particularly in developing and transitional countries. Considering their significance to the visibility of IUPAC and its strategic plan, procedures must be found to facilitate their planning and assure their continuation.

#### **2.5 IUPAC will utilize its global perspective and network to contribute to the enhancement of chemistry education, the career development of young chemical scientists, and the public appreciation of chemistry.**

DCE has not had a strong direct role in chemical education but in its sponsorship of international symposia, congresses and workshops there is an emphasis on providing avenues to support young scientists and materials that are useful in educating, publicising and promoting particular areas of chemistry.

#### **2.6 IUPAC will broaden its national membership base and will seek the maximum feasible diversity in membership of IUPAC bodies in terms of geography, gender, and age.**

DCE maintains a broad membership base, despite the cessation of commissions, through the organisation of its core activities under four advisory panels: Fundamental Environmental Chemistry; Soil, Water & Air Chemistry; Crop Protection Chemistry; Food Chemistry. These panels have wide geographical (24 countries), gender and age distributions and include the TMs, AMs, NRs as well as a range of interested scientists without official titles. It is also noteworthy that the US-NAS Young Observer scheme led to two women scientists from the US joining IUPAC-DCE project teams following the Berlin GA.

### **III. STRATEGY**

Within its objectives on environmental and food safety the Division is expanding its activities to cover comprehensively the areas of chemistry involved in the protection of the environment and the consumer..

The DCE undertakes both fundamental and applied studies aimed at problems in food and environmental chemistry. In this way DCE contributes to global sustainable development.

Despite its overall integrated approach, the Division also operates sectorially to address customer needs:

- Protection objectives (which are partly the basis for the DCE sub-committee structure) including air, water, soil, food and constructions with (integrated) risk assessments and management options. However collaboration with Division VII will be essential to deal authoritatively with human risks.
- Scientific approaches to study processes, the advancement of methodology, the concepts of chemical safety and chemical hazards, with a focus on environmental fate, food and environmental analytical chemistry, modelling environmental processes.
- Chemicals groupings including bulk and fine chemicals, agrochemicals (of continuing high relevance), pharmaceuticals and veterinary drugs, natural toxicants (to expand from mycotoxins), biochemicals and the chemical safety of genetically modified organisms (environment and food).

There are only few items listed in which DCE has not been active so far. This broad concept is to be kept in order to be attractive for a wide range of customers and to react with flexibility to deal with emerging issues timely.

#### **IV. LIST OF MAJOR PUBLICATIONS (2001 – 2003)**

*The Biogeochemistry of Iron*, D. Turner & K. Hunter (Eds), (in cooperation with SCOR) Wiley Book Series No.7, 2001.

*Interaction between Soil Particles and Microorganisms*, P.M. Huang, J.M. Bollag & N. Senesi (eds), Wiley Book Series No.8, 2002.

Wauchope R.D. et al. 2002. "Pesticide Soil Sorption Parameters: Theory, Measurement, Uses, Limitations and Reliability." *Pest Management Science* 58:419-445.

*Atmospheric Deposition and Impact on Ecosystems with Particular Reference to the Mid-East*. Proc. Int. Symposium, June 2000, Tel Aviv, Israel. R. Van Grieken & Y. Shevah (Eds). Publ. René Van Grieken, Universiteit Antwerpen, 2002, 235pp.

*Mycotoxins and Phycotoxins in Perspective at the Turn of the Millenium*. Proc. Xth Int. IUPAC Symp. on Mycotoxins & Phycotoxins, May, 2000 Guarujá (Brazil). Eds: W. J. de Koe, R.A. Samson, H.P. van Egmond, J. Gilbert & M. Sabino. Wageningen, The Netherlands, 2001. 574pp.

Felsot, A.; Racke, K.D.; Hamilton, D. 2003. "Disposal and Degradation of Pesticide Waste." *Rev. Env. Contam. Toxicol.* 160: 123-200.

Lintelmann, J., Katayama A., Kurihara N., Shore L., and Wenzel A. 2003. "Endocrine disruptors in the environment", *Pure Appl. Chem.* 75, No5, .631-681

Hamilton, D.; Ambrus, A.; Dieterle, R.; Felsot, A.; Harris, C.; Petersen, P.; Racke, K.; Wong, S., Gonzalez, R.; Tanaka, K. ; Earl, M.; Roberts, G.; Bhula, R. 2003. Pesticide Residues in Food: Acute Dietary Exposure. *Pest Management Science* 59, In press.

Hamilton, D.; Ambrus, A.; Dieterle, R.; Felsot, A.; Harris, C.; Holland, P.; Katayama, A.; Linders, J.; Unsworth, J.; Wong, S. 2003. Regulatory Limits for Pesticide Residues in Water. *Pure Appl. Chem.*, In press.

Ambrus, A.; Hamilton, D.J.; Kuiper, H.; Greenhalgh, R.; Racke, K.D. 2003. Significance of Impurities in the Safety Evaluation of Crop Protection Products. *Pure Appl. Chem.* In press.

*Physicochemical Kinetics and Transport at Chemical-Biological Membranes*, W. Koester & H. Van Leeuwen (Eds), Wiley Book Series No.9. In press.

## V. PROJECTS

In 2001-2003 there were 10 projects completed or terminated and 6 new projects were approved.

### 5.1 Current approved projects

Project No.	Title	Team Leader	Cooperation	Status/Actions
610/42/97	Physicochemical Kinetics and Transport at Chemical-Biological Interfaces	Koester, van Leeuwen	Several non-IUPAC contributors	Wiley book series No. 9. In-press
1999-033-1-600	Glossary of Terms on Atmospheric Chemistry (revision)	Schwartz Calvert	Widespread - atmos. chem. community	On atmos. chem. website.
630/18/93	Minimum requirements for reporting analytical data from environ. samples.	Egli		Completed. Report published PAC
630/24/95	Solute Movement in Soils with Potential Rapid By-Pass Movement	Kördel		Advanced draft available.
1999-009-1-600	Pesticide residues in food - acute dietary exposure	Hamilton	CODEX, JMPR	Completed. Final report in-press PAC.
1999-010-1-600	Mycotoxin methods for developing countries	Anklam	Coord by EC Ref. Lab. FAO/IAEA	Second round of ILS completed. Report being drafted.

1999-013-2-600	In-situ Treatment of Polluted Soils	Mandelbaum Sadowski		First draft of report available
1999-014-2-600	Airborne & Remote Sensing of Water Quality	Dekker		First draft of report available
1999-017-1-600	Regulatory limits for pesticide residues in water	Hamilton Dieterle		Completed. Final report in-press PAC.
1999-030-2-600	Local air Pollution in Developing Countries.	YH. Zhang Klasinc	IOCD, WHO	Successful workshop held. Guangzhou, China Sept. 2001
1999-032-1-600	Assessment of human exposure to outdoor pollution	Hertel		Completed without funding. Shevah to check report status.
1999-034-1-600	Local Radiation Balance: Influence of Aerosols	Slanina	EU, ECN	Draft of report available
1999-041-1-600	Bioavailability of xenobiotics in soil	Katayama	SC-2	First draft of report available.
2000-016-1-600	Int. Symposium on Endocrine Active Substances. Nov. 02	Miyamoto	SCOPE ICSU	Successful symposium
2001-022-1-600	Global availability of information on pesticides	Racke	FAO/IAEA	Underway
2001-023-1-600	Spray drift: assessment and mitigation.	Felsot		Underway
2001-039-1-600	Pest management for small-acre crops-global approach for crop protection chemistry	Wauchope		Underway
2001-026-1-600	Use of reference soils for testing fates & effects of chemicals	Köedel		Approved August 2002
2001-046-1-600	Pesticides: harmonisation of data requirements and evaluation	HW Kim	Korean Society of Pesticide Science	Approved Dec. 2002 Workshop to be held Seoul, Oct. 2003
2001-024-2-600	Impact of transgenic crops on the environmental impact of agrochemicals	Kleter, Kuiper		Approved with Bureau funding January 2003



## 5.2 New Projects (proposals in system as of 25 June 2003)

<b>Project No.</b>	<b>Title</b>	<b>Leader</b>	<b>Cooperation</b>	<b>Status/Actions</b>
2002-011-1-600	Int. Workshop on Fats & Oils, Morocco, 2004	Dysseler	AOCS R. Cantrill	Revised proposal under consideration
2002-012-1-600	Oils & Fat Processing – use of AOACS training course manual	Cantrill	AOCS	Possibility to combine with above workshop
2002-013-1-600	Validation of ICP method for trace elements in fats	Cantrill	AOCS, AOAC, EU Ref. Lab.	Revised proposal under consideration
2003-011-2-600	A critical compendium of pesticide physical chemical data	Wauchope		In first review
2003-023-1-600	Guidance for designing field surveys and monitoring programmes to ensure compliance with legal limits	Ambrus	IAEA	In first review
2003-013-1-600	Crop protection chemistry in Latin America	Carazo		Workshop proposed for 2005. In first review
2003-014-1-600	Fractal structures and processes in environmental systems	Sensesi		IUPAC/Wiley series: Analytical and physical chemistry of environmental systems
2003-016-1-600	Integrating environmental exposure pathways for medicinal products	Herrchen	EC, US-EPA, GDCh	In first review. Possibly inter-divisional.
2003-017-1-600	Remediation technologies for removal of arsenic from water and wastewater	Garelick		In first review