

Chemistry in Africa: A Joint AAPAC–IUPAC Meeting

11 July 1998, Durban, South Africa

On the occasion of the Seventh International Chemistry Conference in Africa, 5–10 July, 1998, Prof. Joshua Jortner, the current President of IUPAC, and Prof. E. D. Bekoe, the current President of the African Association for Pure and Applied Chemistry (AAPAC) convened a conference of African chemistry leaders with representatives of IUPAC. In the extraordinarily effective one-day meeting, held on 11 July 1998, the participants discussed problems facing the African chemical enterprise and suggested solutions that could be implemented jointly by IUPAC and AAPAC.

Present were Drs. B. M. Abegaz (Botswana), E. A. Aboutabl (Egypt), I. Addae-Mensah (Ghana), B. I. Alo (Nigeria), E. D. Becker (United States), D. A. Bekoe (Ghana), M. D. Booth (South Africa), J. D. Bradley (South Africa), E. L. J. Breet (South Africa), L. Diop (Senegal), E. K. Farraq (Egypt), F. Gasengayire (Kenya), C. F. Garbers (South Africa), J. Jortner (Israel), B. T. Kiremire (Uganda), E. M. R. Kiremire (South Africa), J. M. Malin (United States), C. C. Mjojo (South Africa), T. T. Mokoena (Botswana), J. L. Moswa (Democratic Republic of the Congo), V. S. B. Mtetwa (Swaziland), T. Nyokong (South Africa), J. I. Okogun (Nigeria), H. M. Salem (Egypt), P. S. Steyn (South Africa), S. O. Wandiga (Kenya), and N. S. Youssef (Egypt).

Purposes of the meeting. Host organizer Professor Pieter S. Steyn greeted the participants by noting that the purposes of the meeting were to improve communications between IUPAC and AAPAC, to assist IUPAC in finding a specific role to contribute to Chemistry in Africa, and to help find a route to technology-based development in Africa. Dr. Steyn noted with thanks that the financial sponsors of the meeting were IUPAC, the Foundation for Research Development, Merck, and SASOL Ltd.

Comments by Prof. Joshua Jortner, President of IUPAC, on the strategy of IUPAC to serve the global chemistry community. In welcoming all present, Professor Jortner explained that IUPAC's mission will increasingly involve concentration on the globalization of the scientific-technological endeavor and on recent advances in science and technology. He added that IUPAC will respond to the challenges in the mission-oriented service of chemistry to meet mankind's needs.

Prof. Jortner outlined IUPAC's five-point plan for development in the 21st century. IUPAC will work to strengthen access in developing countries to information and research networks in chemistry and related



Professors B. I. Alo and J. Jortner

fields, to build capacity of developing countries for chemical research, to enhance human educational resources in developing countries, to foster the abilities of developing countries to adapt recent scientific and technological advances to local conditions and needs, and to augment cooperation with regional scientific academies in developing countries.

Prof. Jortner noted that solutions to African problems must be urgently sought, given the impetus of globalization, scientific and technological advances, new information technology, and burgeoning population growth. He pointed out that scientists in developing countries will count increasingly on advances in electronic communication that can dramatically reduce the geographic and political barriers, isolation, and fragmentation that have hampered them in the past. He noted that the keys to success will be found in obtaining needed equipment, training, useful contacts, functioning access to electronic networks, databases and publications, and long-term maintenance and support of networks and equipment.

Prof. Jortner suggested that IUPAC can contribute by helping African chemical scientists to formulate and prioritize their own needs, to emphasize institutional capacity, including management and maintenance, to establish long-term interinstitutional relationships rather than "hit-and-run" short-term studies and assistance, and to realize the potential for increased regional and subregional cooperation.

Comments by Prof. D. A. Bekoe on the role and function of AAPAC in promoting chemistry on the African continent. Prof. Bekoe reminded the participants that the role of the AAPAC, i.e., to foster chemical research and the application of chemistry and allied sciences to capacity building in Africa, is quite



Professor D. A. Bekoe

congruent with the goals of IUPAC. He noted the special problems caused in Africa by population growth. In regard to food production, for example, new lands are brought into cultivation only after the old lands have been exhausted. Prof. Bekoe added that research funding in some countries is weak and getting weaker, having in some cases been reduced by two-thirds. Even so, AAPAC is developing opportunities for joint efforts to obtain support by giving chemical researchers a voice with governments.

Prof. Bekoe suggested that AAPAC can help promote teaching and learning in ways unique to Africa. The solutions sought should be Africa-relevant because learning strategies and cost-effective solutions are not necessarily the same in all parts of the world. Through the International Chemistry Conference in Africa (ICCA) series, AAPAC has already established a dialogue on chemical education. AAPAC discussions on environmental chemistry, theoretical chemistry, and natural products chemistry are stimulating young researchers. Now those new scientists will need access to faster, modern methods of obtaining and analyzing data.

Prof. Bekoe noted that AAPAC and IUPAC both have long-term objectives to foster chemical research and the application of chemistry and allied sciences, with special emphasis on capacity building. Therefore, he said, it is necessary that there be liaison between the two organizations with the goals of (1) strengthening of national chemical associations in the region, (2) working together to encourage chemistry-related industry, particularly large industry, to contribute to sustainable development, creation of wealth, and improvement of the quality of life in Africa, (3) finding ways to work with and learn from IUPAC and other bodies such as ICSU, COSTED, UNIDO and UNESCO, (4) improving the resource base of AAPAC,

and (5) developing more effective scientific communications in the region.

Status of Chemistry on the African Continent

Only two countries in Africa—Egypt and South Africa—are members of IUPAC. There is clearly a need to increase African participation. Prof. Jortner, quoting from an excellent report written for IUPAC by Dr. C. F. Garbers, noted that while Africa includes 62% of the world's developing countries, the distribution of development is not homogeneous. Some 29 of the 51 countries published less than 10 abstracted journal articles in 1996, while Egypt published 2560 in the same year. Among the 45 countries in sub-Saharan Africa, only 3 countries produced the great majority of published research articles in chemistry. They were South Africa (1359 abstracts), Nigeria (384 abstracts), and Kenya (97 abstracts). No abstracts were cited from 5 countries and another 21 countries produced less than 10 abstracts each. Rising university enrollments (mostly in the Arts) and stagnant budgets have caused average per-student expenditures to fall from \$6,300 in 1970 to \$1,500 by 1988.

Dr. Garbers recommended that if IUPAC wishes to embark on further initiatives, a detailed study should be made of an area which is served by so many agencies. He noted that the Committee on Teaching of Chemistry has new and important initiatives to contribute. He suggested that IUPAC, being active in all fields of chemistry and with extensive expertise in publication, could become involved in the preparation of texts for training and reference in selected fields of importance in developing countries. These might include water quality, human health, food analysis, and access to chemical information. Also, the work of CHEMRAWN should be extended to techno-economic analysis of countries and regions to identify potential industrial and market initiatives.

Dr. Garbers noted further that, while neither IUPAC or UNESCO is a major funding organization, together they have the ability to provide direction-giving inputs. One possible approach is outlined in the recommendations made by the recent report of the IUPAC Task Team of African Chemists convened in 1997. The Task Team recommended that IUPAC/UNESCO coordinate a Pan-African chemistry development project, implementing recommendations that will come from a series of five regional workshops. The workshops will involve all African countries, which will be invited to assess the types of support and other inputs necessary. Major funding will be sought from local governments and national and international development agencies.

Dr. Garbers emphasized that there is a tendency to

generalize about Africa, yet huge differences exist among countries and institutions. Many uncertainties and deficiencies exist in higher education, which remains elitist and selective in the admission of students. The rising demand for access to higher education is prompting reconsideration of the university's role in Africa. However, the outcome may ultimately be dependent on political decisions by local governments.



Status of Chemical Education in Africa

The African university environment has changed since the 1960s, a decade described by Dr. B. M. Abegaz as one of hope, euphoria, and romanticism. By the 1970s, expectations had been somewhat reduced, stung by a wave of military coups and the growing politicization of higher education. In the 1980s, disillusionment and decline were the norm. Overcrowding in the universities led to a growing pessimism among students and faculty, along with an overall decrease in quality. The 1990s have seen new hope for successful change and transformation of higher education. However, this is accompanied by increased "donor fatigue" among external agencies and nations.

Prof. John Bradley, Chair of IUPAC's Committee on the Teaching of Chemistry, provided a statistical overview of education of Africa. He noted that the population of Africa was 778 million in 1998 and will grow to 930 million by the year 2005. 236 million (36%) of the current African population are of primary and secondary school age (6–17 years). Prof. Bradley added that the adult illiteracy rate in Africa is 40%, due partly to the fact that public expenditures for education are very low on average, about 6% of the GNP. Nevertheless, numbers of students have increased substantially since 1980 with enrollment ratios in tertiary education currently at 6%, in secondary education 32%, and in primary education 72%. In natural sciences and engineering, the percent of enrolled students varies according to country between 11% and 34%. The number of science students per 10,000 inhabitants is approximately one-tenth that found in Latin America and one-fiftieth that of the United States.

Prof. Bradley observed that many African university professors must undertake supplementary nonaca-

demical jobs to augment meager incomes. There is a chronic shortage of textbooks, virtually all of which must be imported from outside the continent. Laboratories are often cancelled because of a shortage of reagents.

Prof. E. M. R. Kiremire reported on the dire situation facing higher education in Zambia, typical of African countries. Tremendous inflation, exacerbated by a lack of government support and political instability, have caused serious problems. Prof. Kiremire noted that 300 lecturers left Zambia during the 1980s and, unfortunately, for every two professors lost, only one professor was recruited. The age profile of the scientists remaining behind is not encouraging. Some 40% of the university staff are over 50 years of age.

Prof. Kiremire urged that the educational system must concentrate on student study skills and motivation, conditions of service for teachers, improvement of teaching aids, and infrastructure. There is a great need for information technology and library development. Journals published since 1975 are lacking in Zambia, as are textbooks and, especially, computers. There is a need to strengthen basic research and development in Africa to help provide relevance for chemical education. Basic political support with no strings attached needs to be developed for chemical research and education.

Prof. T. T. Mokoena of Botswana reminded the participants that one of the greatest challenges to chemical education in Africa is to make chemistry understandable to the poor. It is extremely important, he said, that the educational system have a clear understanding of the educational environment from which students come and a plan for where the graduates will go.

Prof. Mokoena suggested that undergraduate chemistry programs in Africa suffer from a lack of goals and objectives, overcrowded and authoritarian undergraduate curricula, general scarcity of modern resources, "tunnel vision" caused by undue emphasis

on subdisciplines, too many “drudgery hours”, and lack of regular assessments. He urged that African universities and nations do more strategic planning, carried out in a way that strikes a responsive chord among the people. Educational programs, he said, need to be directed toward acceptable goals.

According to Prof. Mokoena, there is a need to provide high-quality, relevant programs with clearly defined aims and objectives. The programs should emphasize mastery of the use of instrumentation, reduce staff and student time spent in rote learning, and provide for the needs of majors as well as general interest or preprofessional students. The programs should especially include project-based teaching and work experience assignments. There also should be opportunity for distance learners and adults to study chemistry. The structure of the program should prepare students for conventional and applied course options.

The Role of the Chemical Industry in Ensuring Sustainable Development in Africa

Dr. M. Booth, a member of IUPAC's Committee on Chemistry and Industry (COCI) outlined operations of the chemical industry in sub-Saharan Africa. He explained that from a global perspective the chemical industry in Africa is small, operating mainly in South Africa, Zimbabwe, Ghana, Zambia, Nigeria, and Egypt.

The primary manufacturing sectors are explosives, fertilizers, insecticides, petrochemicals, and polymers. Management practice standards, e.g., the Responsible Care program, are applied in the areas of health and safety, storage and distribution, transportation, waste management and pollution control, community awareness and emergency response, and product stewardship.

Dr. Booth noted that the firm AECI has recently opened new explosives factories in two African countries. These new enterprises have created new jobs for chemical professionals. It will be important to educate and hire as many Africans as possible for these new jobs, rather than to import personnel from elsewhere.

Dr. Booth suggested that ways need to be developed to improve the image of chemistry through government, industry, and societal activities. Government must provide clear, unambiguous policies, implementable legislation, and fair enforcement. Industry must care for the health and safety of the workers, be mindful of product stewardship, and be ready to communicate hazards. Consumers must learn to read and understand cautionary labels, use chemicals as directed, and dispose of waste chemicals safely.

Special challenges for Africa lie in existing international legal obligations and treaties, poor ambient environmental quality, development of sustainable consumption and cleaner production, and finding eco-efficient uses of natural resources.

Existing international agreements regulating movement of hazardous waste across international boundaries are a challenge to African countries. No national legislation on the subject exists in South Africa or in Africa generally. Moreover, additions to the Montreal Protocol are making it increasingly difficult for economically disadvantaged nations to conform. African countries are having difficulty implementing the Protocol on Informed Consent (PIC) Convention on the use of pesticides, the Protocol on Pesticides (POP) Convention norms regarding organic pesticides, and standards for compliance to global climate change rules. Africa is one of the most economically vulnerable regions, and therefore it is least able to deal with new or established regulations. African industry needs to participate more in the setting of international protocols.

Africa must move its orientation in environmental practices from environmental protection to sustainable development. This shift in orientation will require careful environmental stewardship, social development, and economic growth. A priority goal will be to begin to eliminate poverty through the fulfillment of basic household needs, such as provision of safe water supplies. This problem can be addressed through sustainable consumption, i.e., through minimization of waste and recycling of chemical materials.

Dr. Booth noted that it is important to share expertise and experience to develop uniquely African solutions to support African industrial development. The challenges in Africa will require replacement of obsolete chemical processes with new, “green” technology. According to one estimate, there is much room for growth since the African economy is on average only about 20% technology driven.

Prof. L. Diop of Senegal reminded the participants that Africa has plenty of natural resources, e.g., coal, minerals, and diamonds. He noted that, even though the image of chemistry has suffered because of pollutants coming from industry, and the field inherits a lot of the blame for pollution resulting from the generation of energy, the chemical industry is nevertheless at the very heart of development. Prof. Diop suggested that Africa should concentrate on small technology for local consumption as a way of building grass-roots markets. Also, Africa should look as an example to the efforts made by Asia in the 1960s. Greater cooperation is needed in setting up joint regional research and production centers. The participants agreed that it is as important in Africa as it is in other regions of the world to publicize the positive aspects of chemistry.

Chemistry and Society in Africa

In his discussion of chemistry and society, Prof. S. O. Wandiga noted that the quality of chemistry in Africa is only as good as the chemists practicing the discipline and the support given to them by society. Chemistry, he said, has been practiced in Africa for a very long time, as can be deduced from ancient stories of wars fought and diseases cured. The old practice of chemistry was limited, however, to the satisfaction of individual needs, the defeat of an enemy, or the performance of cultural rites. The practice of chemistry for commercial purposes is a relatively new phenomenon on the African continent.

Unlike the past, when the art of chemistry was conferred through tutelage by magicians or by divine appointment, the African chemist nowadays is most likely a graduate of a university in Europe, North America, Japan, China, or Africa. He or she is well-versed in conceptual theories and skills and is at ease talking about principles of chemistry or applying cutting-edge analytical techniques.

Why, then does the continent lag behind in development of the chemical industry? Prof. Wandiga suggested the challenges are based on the availability of resources, the knowledge and technical base for the propagation of the industry, market forces, government policy, and general public support for the discipline.

Africa's Resource Base

1) *Human resources.* Every African country today has a critical mass of well-trained and qualified chemists and chemical engineers. Unfortunately, many of the best brains are leaving the continent because they cannot find employment of their choice or because they lack modern equipment. At the same time, a new crop of chemistry practitioners from the Asian continent is finding opportunities to establish factories in Africa for solvent distillation, emulsion preparation, synthetic fiber fabrication, plastics production, and metals refinement. Prof. Wandiga offered his first recommendation, "We must look afresh at the training of chemists in Africa. We need to include entrepreneurial courses in the syllabus, develop the instinct to take risks, and ensure that African graduates are enabled educationally to initiate industrial projects of their own."

2) *The availability of raw materials.* Raw materials are widespread within the

Professors J. L. Moswa, B. I. Alo, D. A. Bekoe, L. Diop and F. Gasengayire

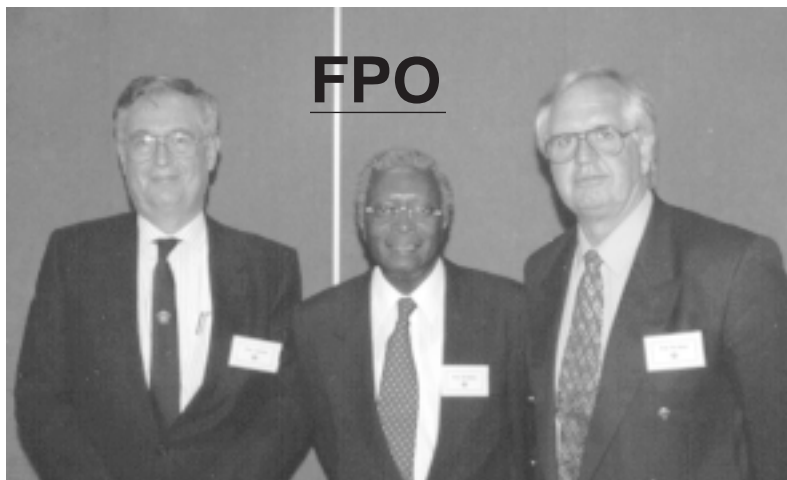
African continent, and some countries are blessed with great abundance of resources like oil, minerals, or natural products. Unfortunately, the exploitation of such natural resources has rarely benefited the citizens. In most cases, raw materials are extracted and exported unprocessed, while in other cases selfishness, based on insecurity among nations, has prevented countries from sharing, developing, and exploiting national resources together with their neighbors. African resources have continually been exploited by foreigners. Prof. Wandiga advised, "Africa therefore needs to develop mutual trust among nations so that available resources can be used to benefit Africans. As long as greed and self-interest prevail over the common good of society, African resources will never be developed by Africans. Cooperation within and among states is essential for development of the chemical discipline. Africa must strive to encourage cooperation in knowledge and technology sharing. As a start, we need to establish, through market forces, industries for partial refinement of available raw materials in order to create added value for our products."

Africa's Knowledge and Technology Base

The African continent now has many knowledgeable chemists, as was demonstrated at the recently concluded Seventh International Chemistry Congress in Africa, but unfortunately much of those persons' knowledge is wasted. The majority of talented scientists in Africa are subject to extreme economic hardships, leading to their own preoccupation with survival. "Restoration of dignity and self-respect to African scientists will release an enormous reservoir of knowledge and ability," observed Prof. Wandiga.

This is the era of computer technology. Development of information and communication technology (ICT) has greatly reduced the barriers to far-away knowledge for persons conversant with ICT. But, a





Professors J. Jortner, D. A. Bekoe, and P. S. Steyn

lack of access to computers in Africa is resulting in a failure to develop computer skills. Certainly, training in the use of ICTs is a must for every chemist on the African continent. "Public domain knowledge and technology for chemical processes are available through information and communication technology for the exploitation and development of Africa's resources. More training is needed in tapping and utilizing such knowledge and technology."

Market Forces

Prof. Wandiga informed the group that, although the total population of Kenya, Uganda, and Tanzania, is near 75 million, the per capita income is only \$200–300. The buying power of African citizens is currently too small to sustain a dedicated domestic chemical industry. A second strong force arises from the current economic situation that compels African nations to export their resources as raw materials. Compounding these forces are weak marketing networks for African products. Under the circumstances, which include falling commodity prices, inflation of local currency, and few markets for African products, chemical research is not an economically important activity. As long as these current forces are dominant, Africa will not develop a chemical industry. Prof. Wandiga observed, "As a start, African countries must break the barriers that exist between states on the continent. Africa further needs to discard the concept that Africans cannot process their own raw material for competitive global trade. Lastly, Africa must redouble its efforts to train its youth to market African products and to use the latest ICT technology."

Enabling Policies

Dr. Wandiga noted that the African policy-making community and national leaders must understand that they need the discipline of chemistry if they are to succeed as rulers. Moreover, African nations, as in all

nations, need to promote the basic principles of quality of life, democracy, and the dignity of and respect for human life. Only through such policies can the majority of citizens excel by applying their intellect, knowledge, and technological skills.

"There must be a high-priority policy to develop and enable the chemical industry. Without direct government support for industry, little can be achieved." Dr. Wandiga recommended that "governments set up priority projects for development of chemical research capability, with concomitant incentives for industrial development. These new progressive policies can only emerge if Africans at both local and international levels accept the principle that it is essential for Africa to trade in finished products. Africa must also implore its brothers in developed countries to stop looking at Africa as a supplier of unfinished, unprocessed raw materials for their industry."

General Public Support

Prof. Wandiga expressed the opinion that the African public is very supportive of the chemical industry, provided the industry continues to supply consumer goods and provide jobs. As public awareness increases, it is essential that industry does not negate the public perceptions through use of "non-green" chemistry processes. Given the high unemployment rate on the continent, the industry will find ready support if it promotes quality of life through employment and responsible care for its products. Prof. Wandia concluded, "Ethical considerations by the industry need to play a leading role in its promotion. At all times one should remember that the African continent is ecologically fragile. Preservation of the environment for future generations is part and parcel of the promotion of the chemical industry on the continent. For the industry to continue to enjoy public support, it must regulate itself and it must take the lead in conservation matters."

Liaison Between IUPAC and AAPAC

Prof. Bekoe opened the discussion of the liaison between AAPAC and IUPAC by noting that the objec-

tives of the two organizations are complementary. The partnership could work to strengthen African chemical societies, and also to advocate industrial development in Africa. There is, he said, a clear need to work toward a form of affiliation between the two organizations. AAPAC has many bright members but it is young and weak in resources. IUPAC assistance to AAPAC through the IUPAC web site would help greatly by sharing information with and among African scientists.

Prof. Jortner added that the AAPAC/IUPAC liaison should be both regional and global. Elements of cooperation could include dissemination of industrial and environmental information, joint planning, catalysis of programs for Africa, including electronic communications, and assistance in interactions with governments

Concluding Remarks, Plans, and Proposals for Future Actions

Dr. Abegaz offered plans and proposals for future actions as follows:

- Chemists should pledge partnership to each other. Country-specific or regional problems should always be addressed with quality and relevance.
- A census should be taken of professional resources in Africa. AAPAC should prepare directories of African scientists and of papers published.
- Problems in obtaining access to chemical information need to be solved. The Internet gives access to information, but well-stocked libraries provide ownership of the information.
- Creative approaches can make scarce instrument resources generally available to African scientists. As an example, NAPRECA can now utilize its FTNMR instrumentation more effectively by sending Free Induction Decay (FID) data directly by e-mail to users for analysis. This use of e-mail allows researchers quicker access to spectra and saves analysis time in the primary instrument facility.
- African institutions need to obtain fairer prices when purchasing instrumentation. Vendors normally charge more in Africa than in developed countries.

In his concluding remarks, Prof. Jortner noted that this meeting between AAPAC and IUPAC officials has inspired deep respect for the chemistry community in Africa as it faces difficult problems, even as AAPAC adopts firm commitments and a sense of purpose for the future. He provided the following summary of the central issues, together with several proposals and conclusions.

1) *Human capital development.* Plans must be made for human capital development in Africa with the understanding of chemistry as the conceptual founda-

tion of materials science, physics, and biology. Goals, objectives, and programs for education on all levels require long-term strategic plans.

2) *Research at the graduate level.* Research in the African university system is essential. The professional development of young scientists, graduate students, post-docs, and beginning faculty members must be a top priority. To help in this area, IUPAC will bring 20 young chemists from developing countries to the Berlin Congress in 1999.

3) *Reduction of braindrain.* While scientists should be free to move wherever their interests take them, IUPAC and AAPAC must strongly recommend that the research systems of Africa take initiatives to bring back young, outstanding scientists after their training abroad. Special programs should be instituted to do this, for example a program of research grants of \$20,000–40,000 over a period of 4–5 years for young scientists who return to Africa. Additional programs should be implemented to foster exchange of personnel in both directions.

4) *Worldwide responsibility.* It is the moral responsibility of the worldwide chemistry community to join forces to help Africa in building its education and research capabilities at all levels.

5) *Bridging the gap between donors and developing countries.* IUPAC might act as an independent, authoritative, nongovernmental, politically neutral body to help with management and accountability in the distribution of research funds in Africa. The Union also could contribute its expertise to assist with external review of research proposals.

6) *Regional and international collaboration.* Support must be found for regional cooperation. Intra-African collaboration is often more limited in scope than is collaboration with countries outside Africa, because most financial support for collaboration originates outside the African continent. Development of an electronic *African Journal of Chemistry* would increase collaboration in Africa and develop worldwide recognition for the chemical sciences on the African continent.

7) *Problems and challenges of the chemical industry in Africa.* While it is important to curb pollution, upgrade industrial technology, and facilitate regional and industry–university cooperation, it is also necessary to develop a “green” chemical industry. Environmentally and economically viable industries must be attracted to Africa.

8) *Environmental chemistry.* Issues of chemistry and the environment were raised in the conference pertaining to pollution, food, water, and health problems. Environmentally benign chemistry solutions will be sought.

9) *Science, society, and government in Africa.* This issue involves public understanding of science and

government science policy. The building of a critical mass of scientific activity and the spreading of the message that chemistry is important for development are crucial. However, while IUPAC's strategic plan (1998) includes the goal of representing the interests of chemistry in governmental and nongovernmental forums, IUPAC will not undertake projects involving local governmental policy development. IUPAC can contribute to the representation of the interests of the chemical community of Africa in governmental forums organized through AAPAC–IUPAC collaboration.

10) *Electronic communications*. The revolution in electronic scientific communications must be brought to Africa by initially setting up a personal computer network, maintaining its infrastructure, making databases available, and organizing training programs to help users.

A Plan for Liaison Between IUPAC and AAPAC

AAPAC and IUPAC together will address regional problems in Africa by developing an electronic communications network, publishing an electronic *African Journal of Chemistry*, instituting environmental workshops and programs for sustainable development,

planning for education at all levels, and helping develop the research infrastructure. A jointly sponsored forum will be established to address the chemistry–government interface in Africa.

AAPAC will provide a bridge between the national chemical societies of Africa and IUPAC. It may be possible for AAPAC to join IUPAC as an Associate Organization, similar to the IUPAC relationship with the Federation of European Chemical Societies. Increased membership in IUPAC by individual African countries, first as observers and later as full members, will be encouraged.

Dr. Jortner proposed that the first IUPAC–AAPAC collaborative project should be to plan an electronic communications scientific highway for Africa. AAPAC is invited to propose the second joint program.

The organizers thanked all present for their participation. In closing, a note of urgency was added by a participant using an African analogy to emphasize the need for immediate action by African scientists and the worldwide scientific community. “It doesn't matter in Africa”, he said, “whether you are a lion or a gazelle. When morning comes, you'd better start running.”

J. M. Malin

News from IUPAC

Project Submission and Approval Process

As was reported in the November 1998 issue of *Chemistry International*, the Bureau, at its recent meeting in Frankfurt, approved a uniform system for the submission and approval of projects for funding by IUPAC. During the period of transition from the current commission-based operation to a project-based operation (1999–2001), funding of the Union's scientific work will be both by the current method of funding Commissions and by the new system of funding projects. Which method is used will depend on the situation and the judgement of the Division Committee. This article describes the procedure to be used to submit a project for funding and the approval process that will be followed. The fundamental steps in the procedure will be described in the form of questions and answers.

Who can submit a project?

Anyone or any group may submit a project, whether or not they are currently members of an IUPAC body. To assist those who are not familiar with the current

projects of the Union, a complete listing has been posted on the Union's web site, <http://www.iupac.org>.

What does a project submission consist of?

A sample Project Submission Form is shown on page 9. Instructions for completion of this form are given below the form. Please note that the form shown is an outline. It is expected that most submissions will be made electronically. The electronic version of the form will be available on the IUPAC web site. Printed forms will be available on request from the Secretariat. The form has been made quite concise, and we expect that supporting material will be included as necessary.

Where should the project submission forms be sent?

All forms and supporting material should be sent to the IUPAC Secretariat at the following e-mail address: secretariat@iupac.org or by mail to: P.O. Box 13757, Research Triangle Park, NC, USA 27709-3757 or by fax to: +1 919 485 8706.

Sample Project Submission Form

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Name of person submitting this form																																	
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Project Title																																	
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Milestones																																	
Outcome																																	
Dissemination Plan																																	
Anticipated Impact																																	
Suggested Referees																																	
Some suggested criteria for retrospective evaluation																																	

Who will evaluate projects?

Each Division Committee and Standing Committee will evaluate projects relevant to its area of interest. Interdivisional projects will be evaluated by all Division Committees or Standing Committees judged to be relevant. If an interdivisional project is approved by the Division Committees, it will then be evaluated for funding by the Project Committee of the Bureau.

What will the evaluation process consist of?

After a proposal for a project is received by the Secretariat, it will be sent to the appropriate Division or Standing Committee(s). After a brief initial review for relevance, the Committee will instruct the Secretariat to distribute the project material to at least three outside referees. When the referees' reports are received by the Secretariat, they will be sent (anonymously) to the project submitter for comment. The referees' reports and the comments from the submitter will then be returned to the Division or Standing Committee for action. Projects approved by a Division Committee will usually be funded from the Division budget. However, projects that are interdivisional in subject matter, or that require additional resources, will be referred to the Project Committee of the Bureau for final decision.

How much time will be needed for this evaluation process?

In general, we estimate that this process should be completed in four months. In some instances, where referees' reports are received promptly, the time may be appreciably shorter. In other cases, where questions arise or funds are not immediately available, approval and funding may take longer.

When can projects be submitted?

Projects can be submitted at any time. It is expected that in the future the project evaluation process will occur continuously, with no set time for submission of projects. Funds will be available as soon as a funding decision has been made. This year, most of the Division Committees plan to make their funding decisions at the General Assembly. In order to allow sufficient time for the process, we urge you to submit your project material as soon as possible—at least 3–4 months before the General Assembly.

How long should a project take?

Projects should be for whatever period is necessary to complete the objectives of the project. Few projects will probably be for less than 12 months and few should be longer than 3 years. There is no need to fit the time

frame of a project into the biennial period defined by IUPAC General Assemblies.

Who can work on a project?

The project leader can choose the Task Group for the project. These need not be scientists who are currently members of an IUPAC body.

What is the amount of funding available for a project?

While there is no limit to the size of a project, it is expected that most projects will be funded for less than USD 5 000.

What can project funds be used for?

Project funds can be used for travel, administrative costs such as word processing, printing, programming, or any other expenses necessary for completion of the objectives of the project. It is not expected that IUPAC will fund projects that call for significant laboratory research to be paid for by project funds.

Other Information

Division officers will be sending out information to Commission officers regarding procedures specific to each Division. Please feel free to contact your Division officers or the Secretariat if you have any questions.

Project Submission Form

Anyone or any group can submit a project, whether or not they are currently members of an IUPAC body. Projects can be submitted at any time. See the additional *Guidelines for Completion of the Project Submission Form* and the FAQs on *Project Submission and Approval Process* for detail information; also available on the Union's web site at <http://www.iupac.org/projects>.

The form should be completed with a word processor and returned to the IUPAC Secretariat, preferably as an e-mail attachment at secretariat@iupac.org.

Guidelines for Completion of Project Submission Form

Introduction

IUPAC has long been recognized as the world authority on chemical nomenclature, terminology, standardized methods for measurement, atomic weights and many other critically evaluated data. Projects sponsored by IUPAC should address one of the goals listed

in the IUPAC Strategic Plan. The Strategic Plan can be downloaded from the IUPAC web site, <http://www.iupac.org>, or a copy can be requested from the Secretariat. After completion, the Project Form should be returned to the IUPAC Secretariat, **not** to any other person or body in IUPAC. The address of the Secretariat can also be found on the IUPAC web site. All completed forms will be sent to the appropriate Division Committee or Committees. Interdivisional Projects, projects from Standing Committees and projects too large for a Division will be reviewed by the Project Committee of the Bureau. While there is no set schedule for the evaluation process, it is not expected to take more than four months.

The Division Committees will assign referees for each project. After return of the referees' evaluations, the Division Committee will forward projects to the Project Committee of the Bureau that are either interdivisional or too large for the Division to fund from its own resources. Final funding decisions will be made by the Division and Standing Committees and the Project Committee either by correspondence or at a meeting. There are no set times for approval decisions to be made. Decisions will be taken during the course of the year as projects are submitted and the necessary information has been gathered.

Guidelines

Project Title

Short descriptive title of project.

Relevant IUPAC Body

The name of the Division(s) or Standing Committee that should oversee this project.

Task Group Chairman

Name of person(s) who will be responsible for project, if known. If not known, please indicate how the Task Group Chairman will be selected and names of possible candidates.

Committed Members of Task Group

Names of members of task group who have committed themselves to work on the project, if known. If not known, please indicate how they will be selected.

Objective

Describe the objective of the project in one or two sentences. The objective should explain the value of the project to the field of chemistry involved.

Category

Indicate if the project falls into one of the standard categories: nomenclature (including terminology, symbols, and units); classification; critical data compilations; standardization of methods; workshops; innovative conferences. This section may be omitted if the

project does not fall into one of the standard categories.

Description

The description should be relatively brief (<250 words) and should enable the reader to understand the purpose and methods used in the project. Additional background information and supporting documentation may be provided if it is needed to permit evaluation of the proposal. A copy of the "Advice for Project Reviewers" is available on <http://www.iupac.org> to help you in deciding what information to include.

Goals & Strategic Thrusts

Indicate which of the Goals and Strategic Thrusts of the current IUPAC Strategic Plan are addressed by the project. The Strategic Plan is available on <http://www.iupac.org>.

Budget

The budget should include all planned expenditures over the lifetime of the project. Costs for dissemination of the results should be included. These costs might include holding a workshop or special symposium at a Conference to publicize the results of the project. Travel expenses include total costs for attending meetings of the task group. Administrative costs include secretarial costs, extraordinary communication costs (e.g., mailings), costs for meeting facilities, software development, research assistance, etc. Please note that IUPAC projects are not intended to be original research projects and the cost of new research work should not be a part of the project costs.

External Funding

Is this project a candidate for external funding, e.g. by ICSU? Final decisions on submission of a project for external funding will be made by the Project Committee. The Project Committee can decide to submit a project for external funding even if this part of the form is left blank. If a particular external funding agency has been approached about funding this project, please describe the nature of the discussions.

Time Frame

Indicate the planned start and completion dates of the project. The expected duration of IUPAC projects is two to three years. For longer term projects it may be preferable to break the project into phases. Each phase should have an interim report. Projects need not conform to the IUPAC biennial budget cycle. That is, a Project can begin at any time in one biennium and end in another.

Milestones

Major milestones, such as completion of first drafts of a report, dates of task group meetings should be given.

Outcome

Is the final product of the project a recommendation or report to be published in *Pure and Applied Chemistry* or another journal, a book, a workshop, a conference, a set of instructional materials, a web page?

Dissemination Plan

How will the results of this project be disseminated to the affected community? How will nomenclature recommendations, for instance, be made known to practitioners or the intended audience? A good dissemination plan is a vital part of the project.

Anticipated Impact

How will the results of the project affect practitioners?

Suggested Referees

Please suggest the names and addresses of at least three external referees who can be asked to evaluate the project.

Some Suggested Criteria for Retrospective Evaluation

How should the success of the project be measured and when? For instance, have recommendations been adopted by journals as part of their instructions for authors? Should this be evaluated in one year or three after the end of the project?

News and Notices from Other Societies and Unions

XXIII Latin American Chemical Congress, 26–30 July 1998, Rio Grande, Puerto Rico

The XXIII Latin American Chemical Congress was organized by the Federación Latinoamericana de Asociaciones Químicas (FLAQ) and the Colegio de Químicos de Puerto Rico. There were more than 800 participants at the Congress which featured 9 plenary sessions, 4 symposia, 72 mini-courses for continuing education in all areas of chemistry, and 12 sessions covering biochemistry, inorganic chemistry, agricultural chemistry, organic chemistry, chemical education, analytical chemistry, natural products, environmental chemistry, organic synthesis, medicinal chemistry, and physical chemistry. Contributors came from 16 countries: Argentina (4), Brazil (9), Bolivia (3), Canada (3), Chile (39), Colombia (39), Cuba (20), Spain (3), United States (13), México (90), Panamá (4), Puerto Rico (43), Dominican Republic (1), Uruguay (1), Venezuela (6).

Special guests included Dr. Paul Walters, President of the American Chemical Society, Prof. Ernest Eliel, Past-President of the ACS, Dr. John Malin, Director of International Activities of the ACS, Dr. Edwin Becker, Secretary General of IUPAC, and Dr. John Jost, Executive Director of IUPAC. In addition, delegates from the chemical societies of Bolivia, Colombia, Cuba, Chile, México, Panamá, Perú, Puerto Rico, República Dominicana, and Venezuela attended.

The plenary speakers included Nobel Laureates Dr. Roald Hoffman (USA) and Dr. Mario Molina (USA) as well as Dr. Mario Suwalsky (Chile), Dr. Nelson Duran (Brazil), Dr. Ernest Eliel (USA), Dr. Pedro Joseph Nathan (México), Dr. Héctor Abruña (USA), Dr. Antonio Monge (Spain) and Dr. Roger Bybee (USA).

At the meeting of FLAQ delegates, Dr. Gabriel Infante was elected President and Lic. Madeline Pardo was elected Secretary General for the period 1999–2000 (both of Puerto Rico). The Secretary and Treasurer of FLAQ continue to be Dr. Juan de Dios Guevara and Dr. Leonidas Unzueta respectively (both of Perú).

The XXIV Congress will be held in Perú in 2000.

Smooth Transition to Improved ISO 9000 Standards

Change-over to the improved ISO 9000 standards, which the International Organization for Standardization (ISO) aims to publish in November 2000, will be a smooth one for the businesses around the world which are implementing the current versions.

“A major requirement of the ISO 9000 revision process is that organizations which have implemented the current ISO 9000 standards will find it easy to transition to the revised standards,” says ISO, adding, “Transition planning guidance is being produced.” ISO gives the assurances in a recent document, “Introduction to the revision of the ISO 9000 standards”. An estimated 200 000-plus ISO 9000-based quality management systems are being operated worldwide by organizations of all types in order to ensure their efficiency and their ability to meet their customers’ requirements. As a result, interest in the Year 2000 revisions of the standards is intense, and ISO is keen to keep current and future ISO 9000 users up to date on developments.

The Introduction document summarizes the reasons for revising the ISO 9000 standards and outlines the direction the revisions are taking. In fact, all ISO standards (currently more than 11 500) are reviewed at least every five years to ensure that they remain the state of the art. The ISO 9000 series was published in

1987 and lightly revised in 1994. The Year 2000 revisions will be much more thorough-going, taking into account the considerable international experience of implementing them.

However, ISO says that the revised standards, like the current ones, will impose no rules on the presentation of a quality manual. It states, "This will allow organizations to continue to document their quality management systems in a manner which reflects their own ways of doing business. The revision of the ISO 9000 standards will not require the rewriting of an organization's quality management system documentation."

In order to ensure that the revised standards will be of maximum benefit, ISO has conducted an international survey of user requirements. In addition, it has an ongoing process which allows for direct feedback from users and customers at key points during the development of the revisions. This process is helping to determine how well user requirements are being met in the documents under development and to identify opportunities for improving them further before publication as ISO standards.

The revised standards, ISO 9001 and ISO 9004, are currently at the stage of "Committee Drafts" (CDs), which normally are internal documents circulated for comment only to the ISO members directly participating in their development. After the CD stage, the standards are released to ISO's membership as a whole as Draft International Standards, which are publicly available documents. Due to the huge interest in the ISO 9000 revisions, orders for the CDs of ISO 9001 and ISO 9004 may be addressed to ISO national members and to the ISO Central Secretariat. However, it should be understood that the documents are dynamic ones which will certainly evolve before they reach the status of International Standards.

ISO/TC 176/SC 2, the ISO technical body responsible for developing the revised standards, has established a World Wide Web site to provide information. Users who would like to give input or participate in the validation of the standards may contact ISO/TC 176/SC 2 directly via the web site: <http://www.bsi.org.uk/iso-tc176-sc2/>. Information may also be obtained from ISO's national members, as well as being posted on ISO's own web site, *ISO Online*: <http://www.iso.ch/>. For more information: Roger Frost, Press Officer, Tel.: + 4122 749 0111, Fax: + 4122 733 34 30, E-mail: frost@iso.ch.

WHO and Pharmaceutical Industry to Set Up Joint Working Group

With one-third of the world population deprived of easy access to the most essential drugs and vaccines, the World Health Organization (WHO) and the phar-

maceutical industry decided to set up a joint working group that will analyse the situation and make recommendations to overcome existing bottlenecks.

The group will be formed and start its work in the immediate future. Its composition will be agreed in consultation with the International Federation of Pharmaceutical Manufacturers Association (IFPMA), which currently represents over 50 national associations of research-based pharmaceutical companies from countries in every WHO region.

This decision was made on 21 October 1998, after a four-hour meeting organized at WHO in Geneva between Dr. Gro Harlem Brundtland, WHO's Director-General, who initiated the meeting, and ten senior representatives of the pharmaceutical industry, selected by the IFPMA.

"The decision we have taken is a first step to benefit an estimated 100 million people worldwide through improved cooperation between the public and private sectors. I am looking forward to further development in this area," stated Dr. Brundtland.

"We in the pharmaceutical industry are pleased to see changes in the renewed WHO, changes that could potentially make everybody a winner. It is up to all of us now to translate this potential into actions," commented Dr. Harvey E. Bale, Jr., Director-General of the IFPMA.

News from the Federation of European Chemical Societies (FECS) General Assembly, 17–18 September 1998, Istanbul Turkey

Millennium Celebrations

100 Distinguished European Chemists

The President informed the General Assembly that the project had been approved by the Executive Committee in March and that in August member societies had been sent a letter inviting them to submit nominations by the closing date of 26 February 1999.

Guidelines for considering the nominations would be approved by the Executive Committee in October. The Working Party on the History of Chemistry would be involved in the selection process, the final decision to be taken by a selection committee

FECS Calendar

The President informed the General Assembly that plans for a calendar to mark the Millennium had been approved by the Executive Committee, although the question of the necessary funding had not been resolved.

FECS Web Pages

The President urged member societies to develop their own web pages, if they did not already exist, and use the help that was available from the Royal Society of Chemistry. He urged member societies to make use of the opportunities provided by Chemsoc for the use of chemical societies and their members, the alternative being commercially provided sites. Dr Gagan added that the Chemsoc web site was a valuable service for Divisions. The General Assembly noted the development of the IUPAC and ACS web sites.

Dr. Inch commended in particular the developing conference database within Chemsoc, and encouraged member societies to contribute information.

The European Chemist Magazine

Dr. Inch drew attention to the first issue published in May and urged member societies to provide information that could help create future issues, the next one being expected in November/December. He explained that a major problem was to assemble a number of people who are able to provide information from different countries which could be analysed for its European significance. Until the quality of the magazine meets the required standards, he is not planning to approach industry for sponsorship. Approaches to member societies for firm commitments to purchase the magazine will be made in due course.

Future Direction of FECS

Divisional Status

The General Assembly considered the circulated papers. Dr. Jensen and Professor Pasykiewicz presented the applications of the Working Parties on Chemistry and the Environment and Organometallic Chemistry for Divisional status. The General Assembly noted that the Working Parties met the required criteria concerning membership and level of activities and accepted the recommendations from the Executive Committee

Green Chemistry

Dr. Jensen reported that the European Environment Agency (EEA) had invited FECS to help organize a European Green Chemistry Award similar to the U.S. Green Chemistry Award. The EEA expected that funding would be available via the European Commission, and planned to publicize the award in the summer of 1999, with the first awards (possibly one academic and one industrial) being made in the year 2000.

There was some discussion of the use of the word 'green', which was not well accepted in all European countries, although it was possible that the U.S. influence would eventually prevail. Dr. Inch reported that in considering the terms 'sustainable' and 'green', the

RSC had concluded that sustainable chemistry went beyond green chemistry. It was noted that the preliminary proposal was for the FECS to appoint and oversee the work of an awarding panel and that the Green Chemistry Network in York University might be asked to be the administrative body.

The General Assembly gave approval in principle to the proposal to work with the EEA in organising a European Green Chemistry Award and agreed that the Division of Chemistry and the Environment should be authorized to continue the discussions and act on behalf of FECS. Dr. Darms urged that efforts should be made to ensure the right amount of visibility for the FECS name in association with the award.

Dr. Malin gave a presentation highlighting the many international activities of the ACS which incorporated green chemistry. The ACS Committee on Environmental Improvement was actively involved in the U.S. Green Chemistry Award. Much staff activity was devoted to, for example, the organisation of workshops in collaboration with other bodies.

Dr. Czedik Eysenberg reported that the Austrian Chemical Society had a working party looking at life cycle questions.

Dr. Inch reported on the arrangements to establish the Green Chemistry Network at the University of York, financed by the RSC, and the plans to publish a green chemistry journal/magazine.

Dr. Jensen invited representatives to send him by post any further information that was available.

International Chemistry Celebration 1999

Dr. Malin circulated information about the plans for the International Chemistry Celebration in 1999. He urged FECS member societies to inform the ACS of any national activity, e.g. national chemistry day, in order to have it included in the diary of events worldwide. The website is <http://www.acs.org/memgen/meetings/ichc/ichc.htm>. The General Assembly delegates indicated that about half of the member societies present had submitted registration forms.

Dr. Walter drew attention to the creation of International Landmark Sites and said he would welcome information to help select other joint activities that could receive this designation.

European Communities Chemistry Council

The General Assembly noted the minutes of the meeting held in March 1998. Professor Alderweireldt drew attention to the European Chemist (EurChem) designation, involvement in which is no longer restricted to ECCC member societies. The EurChem designation is available to members of all FECS member societies who can meet the criteria for membership of the European Chemist Registration Board.

IUPAC

Dr. Hayes, Vice-President of IUPAC, gave an outline of the structure of IUPAC and presented the circulated document on future strategy. He then highlighted his desire for a clearer view of the respective roles of, and links between, the IUPAC as a global organisation, the regional organisations such as FECS, and the national organisations, in order to avoid duplication of effort. He referred to the problems caused by the fact that funding via national adhering organisations left many national chemical societies not directly involved in IUPAC. He also reported that improved links with industry will be pursued, and the Associate Member scheme is shrinking.

The General Assembly noted that decisions on future action would be put on the IUPAC website <http://www.iupac.org/>.

Future Strategies of Divisions and Working Parties

Division of Analytical Chemistry: The President, as interim Chairman of the Division, following the death of Professor Robert Kellner, reported the appointment of a new Chairman, Professor M. Valcarcel, Spain and a new Secretary, Professor Korte, Germany. He stated that a report from Euroanalysis 10 in Basel will be published. The next two Euroanalysis meetings will be in Lisbon in 2000 and Dortmund in 2002. The publication of the 2nd edition of the 900-page analytical chemistry textbook based on the Eurocurriculum is a major project and it is expected that this edition would be more widely applicable to university chemistry teaching worldwide.

Division of Food Chemistry: Dr. Battaglia reported that, in the light of his appointment as FECS President Elect, the Division would need to appoint a new Chairman. The Division's links with the European Commission were developing well and he hoped in time that the Division would be accepted as the body of reference to the European Union. He commended to other Divisions the strategy of having individuals formally recognized as experts. The General Assembly supported the Division's efforts to influence Springer to use the English name *International Journal of Food Research*, instead of the German title *Zeitschrift für Lebensmittel Untersuchung und Forschung*, to promote wider circulation. He reported collaboration with the medical community in the Symposium on Food Allergenicity in Taormina. The 10th Eurofoodchem will be held in Budapest.

Division of Chemical Education: Dr. Gagan reported that this was the Division's 25th anniversary year. A special edition of the *International Journal of Science Education* had been prepared by the Division. The first European Conference on Chemical Educa-

tion, in Budapest in August, had been attended by 200 Hungarian teachers of chemistry and 150 participants from 30 other countries. The FECS Lecture had been given by Professor A. Johnstone, University of Glasgow. The next European Conference would be held in 2001 in Portugal, avoiding overlap with the International Conference held in alternate years. The 5th ECRICE, in Greece later in 1998, included a workshop for young researchers.

Division of Chemistry and the Environment: Dr. Jensen reported on the success of the recent Conference on Atmospheric Chemistry and Air Pollution in Copenhagen. Following the conversion to a Division, the next business meeting will consider the establishment of subgroups. The next Euroenvironment Conference will be held in Oporto in 2000. A venue for the 25th anniversary conference in 2002 will be sought. The Division was actively cooperating with the European Chemistry Thematic Network activity and Dr. Jensen planned to develop links with IUPAC.

Division of Organometallic Chemistry: Professor Pasykiewicz reported plans for the XIIIth FEChem Conference on Organometallic Chemistry on 29 August–3 September 1999 in Lisbon. The Division supported local activity in Poland and Germany and held regional seminars for Ph.D. students. The web site listed the names, together with fields of interest, of those members working in organometallic chemistry

Working Party on Computational Chemistry: Dr. Naray Szabo reported that the next conference will be in Italy in 2000. A directory of European computational chemists is being compiled for publication on the Internet. Summer schools, mostly in Italy, are being organized. He added that the long-term aim is to become a Division.

Working Party on History of Chemistry: In the absence of Dr. Deelstra, the President reported that, in addition to the *Guide to Museums*, the Working Party is planning a history of chemical societies. Another in the series of lists of important events in the history of chemistry, giving anniversaries for 1999 and 2000, is expected.

President Elect

The President reminded the General Assembly of the provision in the statutes for appointment of the President Elect: *The Executive Committee shall nominate to the General Assembly one individual for appointment as President of the Federation of European Chemical Societies. The individual shall serve for one year as President Elect before taking up the office of President. The President shall serve for a single term of three years and may not be re-elected for a second consecutive term of office as President.*

The President presented the recommendation from

the Executive Committee and the General Assembly agreed to appoint Dr. R. Battaglia, New Swiss Chemical Society, to serve initially for one year as President Elect with the effect from the end of the General Assembly and succeed Professor Niinisto as President in September 1999. (See below for a biographical sketch of Dr. Battaglia.)

Composition of the Executive Committee

The President informed the General Assembly that there were four vacancies for individuals to serve on the Executive Committee for three years from September 1998. He stressed that elected members of the Executive Committee serve in a personal capacity, not as representatives of a member society. The General Assembly accepted the recommendation from the Executive Committee that Dr. R. Darms, Professor S. Gultekin, Professor V. Simanek, and Professor A. Zamojski be elected to the Executive Committee.

Membership of the Federation

The General Assembly received the circulated application and accepted the recommendation from the Executive Committee that the Lithuanian Chemical Society become a member of FECS.

Relations with Other Bodies

American Chemical Society

Dr. Walter, President of the American Chemical Society, gave a presentation on international links and the increasing interdependency of national chemical societies. He believed that the promotion of global co-operation was a vital role for chemical societies.

He outlined his proposal that there should be a 'C7' group of the major national chemical societies, including the GDCh, the RSC, and the Chemical Society of Japan, having special responsibilities since they were better equipped in terms of wealth and knowledge. He proposed that an agenda for such action be discussed in Berlin in August 1999.

The President questioned the need for another new organisation in the form of an 'exclusive club', bearing in mind the plans for increased IUPAC activity. Dr. Walter responded by explaining that he saw it not as another organisation but as an opportunity for a group with common interests to compare what they do and see what they could do jointly. He referred to the fact that IUPAC member organisations were often the national academy rather than the national chemical society.

The President referred to the existence of the International Council for Chemistry, and Dr. Hayes explained that it was a IUPAC/UNESCO collaborative activity promoting links with developing countries.

During discussion of recruitment, Dr. Walter reported that the ACS membership campaign had hitherto been confined to the United States. He acknowledged that extending it to countries in Europe could be perceived as competing with national societies and said he would welcome suggestions on how action could be taken without endangering existing good relationships. It was suggested that reduced fees for members of European societies could be an option.

The President thanked the President of the American Chemical Society for his presentation and participation in the General Assembly meeting.

General Assembly

Dr. Herve presented the invitation from the Association of Finnish Chemical Societies to hold the 1999 General Assembly meeting in Finland and this was unanimously accepted. She confirmed that the General Assembly would be held on 16–17 September 1999 in Helsinki.

Appointment of New President Elect of FECS

At its recent General Assembly, FECS appointed Dr. Reto Battaglia, of the New Swiss Chemical Society, as its President Elect. Reto Battaglia will serve one year as President Elect before succeeding Professor Lauri Niinisto as President of FECS after the 1999 General Assembly in Helsinki on 16–17 September 1999.

Reto Battaglia has been involved in the work of the Federation since 1981, having been a member of and, since 1995, Chairman, of the Division of Food Chemistry. He has been President of the Swiss Society of Food and Environmental Chemistry and has been active in the IUPAC Commission on Food Chemistry.

Following his doctoral studies at ETH Zurich, Reto Battaglia was a post-doctoral fellow at the University of Manchester (UK) in organic synthetic chemistry. In 1973 he joined the Cantonal laboratory of Zurich, later becoming deputy head. Since 1989 he has been Director of Migros Laboratories, Zurich.

FECS Award for Service

FECS has decided to give its 1998 Award for Service to Dr. Johannes van Spronsen of the Royal Netherlands Chemical Society, The Hague, The Netherlands.

The FECS Award, consisting of a medal and a scroll, was given to Dr. van Spronsen in recognition of his services to FECS and for his outstanding work as a historian of chemistry.

Dr. van Spronsen is the present Secretary and former Chairman of the Working Party on the History of Chemistry of the FECS. Dr. van Spronsen has edited

for the FECS the *Guide to European Chemical Museums and Exhibitions* (3rd edition in 1998) and in addition has authored other books on the history of chemistry. His earlier international medals and awards include the Gillis Prize of the Royal Flemish Academy, Dexter Award of the American Chemical Society, and, more recently, the Liebig-Wohler Friendship Prize.

New Officers of the Kuwait Chemical Society

At the Kuwait Chemical Society General Assembly held on 7 October 1998, the following office-bearers were elected:

President: Dr. Abdulaziz Alnajjar
Vice President: Mr. Adnan Alshalfan
Secretary General: Mr. Marzooq Al-Shemmari
Treasurer: Mr. Mohammed Alqallaf
Executive Committee: Mrs. Samirah Al-Houli, Dr. Ahmed Karimi, Ms. Khalidah Aldalama, Dr. Ali Saleh Al-Omair, and Mr. Majed Al-Asfoor

New Officers of the Bangladesh Chemical Society

The 21st Annual Conference of the Bangladesh Chemical Society was held 22–24 October 1998 at Bangladesh Chemical Industries Corporation, BCCI Auditorium, Dhaka. Sheikh Hasina, the Honorable Prime Minister, Government of the People's Republic of Bangladesh, was present as the Chief Guest in the inaugural session. The theme for the symposium of this conference was "The Impact of Free Market

Economy on the Industrialization of Bangladesh." More than 500 chemists from different universities, industries, research organizations, and educational institutions attended the conference.

Researchers from different organizations presented their papers in six technical sessions, all of which were well attended.

An Executive Committee consisting of 22 members was elected for two-year terms, which assumed office from 2 November 1998.

Executive Committee of the Bangladesh Chemical Society

President: Professor S. Z. Haider
Vice-President: Mr. A. S. Salah Uddin Ahmed and Mr. Md. Shafiqur Rahman
Treasurer: Dr. Akhtar Uddin Ahmed
General Secretary: Professor Jasim Uddin Ahmad
Joint Secretary: Dr. Tofail Ahmad Chowdhury & Mr. Md. Shafiqul Islam
Publicity Secretary: Mr. Md. Masuder Rahman
Organizing Secretary: Mr. Md. Sanowar Hossain Mondal
Social Welfare Secretary: Capt. (Retd.) A. B. M. Nowsher Alam

Members: Mr. Abu Hayder Ahmed Naser, Dr. Mobarak Ali Akand, D. M. Ali Hossain, D. Md. Mominul Huque, Mr. Kazi Saidul Haque, Mr. Md. Abdul Aziz Mollah, Mr. Md. Abdus Samad, Mr. Md. Ashraf Hossain, Mr. Md. Nurul Islam, Prof. A. M. Shafiqul Alam, Prof. Mesbahuddin Ahmad, Prof. (Mrs.) Tajmeri S. A. Islam.

Reports from IUPAC-Sponsored Symposia

The OECD Workshop on Sustainable Chemistry

Introduction

The Workshop on Sustainable Chemistry (hosted by the Interuniversity Consortium *Chemistry for the Environment*) was held at Fondazione Cini (Venice, Italy) from 15–17 October 1998. This international event was co-sponsored by the governments of Germany, Italy, Japan, and the United States in cooperation with the International Union of Pure and Applied Chemistry (IUPAC) and the Business and Industry Advisory Committee to the OECD (BIAC). Also participating in the organization of the workshop were the OECD (Organisation for Economic Cooperation and Development) and the Interuniversity Consortium *Chemistry for the Environment*.

Joe Carra (U.S. Environmental Protection Agency) and Pietro Tundo (Interuniversity Consortium *Chemistry for the Environment*) co-chaired the workshop. Seventy-five experts attended, representing 16 member countries, the European Commission, industry, and nongovernmental organizations.

Within the broad framework of sustainable development, we should strive to maximize resource efficiency through activities such as energy and nonrenewable resource conservation, risk minimization, pollution prevention, minimization of waste at all stages of a product's life cycle, and the development of products that are durable and can be reused and recycled. Sustainable chemistry strives to accomplish these ends through the design, manufacture, and use of efficient and effective, more environmentally benign chemical products and processes.

Prior to the workshop a survey was conducted to collect basic information on sustainable chemistry activities recently completed or ongoing in member countries. This information included activities initiated by governments, academia, and industry, and which are managed solely by one of these parties or in a collaborative fashion (e.g., government/industry partnership). The results of this survey were discussed at the workshop.

The workshop focused on the policy/programmatic aspects of sustainable chemistry initiatives, as compared to the technical aspects of any particular approach, with a mandate to

1. identify the types of sustainable chemistry activities underway;
2. identify effective techniques and approaches in the field of sustainable chemistry (including educational approaches), highlighting problems encountered and considering solutions; and
3. identify activities that can further the development and use of sustainable chemistry programs.

Breakout Sessions

Five breakout sessions were held in parallel, at which the topics listed above were discussed. The results from these discussions were reported in the plenary session. The plenary session then developed a consolidated paper summarising the discussions and recommending further work.

Breakout Session 1

Object: Recognize sustainable chemistry accomplishments by the chemical industry and scientists in universities and research institutions

Co-chairs: Paul Anastas (U.S. Environment Protection Agency) and Ferruccio Trifirò (University of Bologna, Italy)

Goal: Provide effective awards and recognition for the purpose of promoting sustainable chemistry

Breakout Session 2

Object: Dissemination of technical information and event information related to sustainable chemistry

Co-chairs: Joe Breen (U.S. Green Chemistry Institute) and Alvise Perosa (Ca' Foscari University of Venice, Italy); rapporteur: Dennis Hjeresen (Los Alamos National Laboratory)

Goals: Promote the development and functioning of an international sustainable chemistry community

Breakout Session 3

Object: Support and promote the research, discovery, and development of innovative sustainable chemistry technologies

Co-chairs: Masao Kitajima (Japan Chemical Innovation Institute) and Junshi Miyamoto (IUPAC); rap-

porteur: Uwe Wolcke (Bundesanstalt für Arbeitsschutz und Arbeitsmedizin)

Goals: Stimulation of interest in assessments, industry, academia, and the public in sustainable chemistry as a basis for national and international research programs; identification of mechanisms to support/promote research; description of ways to implement research programs

Breakout Session 4

Object: Develop guidance on how to implement sustainable chemistry programs for use by OECD member countries and others

Co-chairs: Peter Hinchcliffe (UK Department of Environment, Transport, and Regions) and Herwig Hulpke (BAYER - AG); rapporteur: John Keating (Canada Natural Resources)

Goal: Individuate the mechanisms to develop guidance on how to implement sustainable chemistry programs for use by OECD member countries and others

Breakout Session 5

Object: Promote incorporation of sustainable chemistry principles into the various levels of chemical education

Co-chairs: Tracy Williamson (U.S. Environmental Protection Agency) and Giuseppe Blasco (Inter-university Consortium Chemistry for the Environment, Italy); rapporteur: John Warner (University of Massachusetts).

Goals: Educate all people involved in products and processes on sustainable chemistry; includes those who currently are involved as well as those who will be involved in the future; includes educators.

It was evident from the workshop that there is considerable interest and enthusiasm within academia, industry, government, and NGOs for both the basic concepts and practical developments in the field of sustainable chemistry. Italy, Japan, Germany, the United States, and Austria presented considerable information on developments in sustainable chemistry.

Workshop Outcomes

I. Conclusions/Workshop Statement

Workshop participants agreed that sustainable chemistry provides a cost-effective means of

- reducing chemical threats to health and the environment;
- accelerating the pace of chemical innovation; and thereby
- contributing to economic competitiveness and sustainable development.

Workshop participants also agreed that efforts

should be made to promote the establishment of such programs by governments, industry, and academia.

II. Recommendations

In order to achieve this aim, the workshop made a number of recommendations either of a general nature that apply to all aspects of sustainable chemistry, or of a more specific nature that apply to one of the objectives listed above. The recommendations follow.

General Recommendations

The following two overarching recommendations would facilitate the promotion of sustainable chemistry in general and also the implementation of the more specific workshop recommendations.

Recommendation 1: The existing OECD Steering Group that was formed to organize the workshop should remain intact and take on the new responsibility of overseeing the implementation of these recommendations. As part of these duties, the Steering Group will form work groups or study groups as necessary.

Recommendation 2: OECD should publish the proceedings for this workshop (including the results from the OECD-wide survey), provided funds are available.

Specific Recommendations

The following recommendations are organized according to the themes that were the focus of the five breakout sessions.

1. Awards and recognition for work on sustainable chemistry.
2. Exchange of technical information related to sustainable chemistry
3. Research and development
4. Guidance on activities and tools to support sustainable chemistry programs
5. Sustainable chemistry education

Awards and Recognition for Work on Sustainable Chemistry

Recommendation 3: OECD should begin an activity which (1) establishes an *international* program for rewarding and recognising work in the area of sustainable chemistry; and (2) provides guidance to countries interested in establishing *national* programs. This activity will promote the incorporation of sustainable chemistry concepts into all aspects of chemistry and environmental sciences and the industrial sectors they affect by recognizing the value of this approach with respect to environmental and economic sustainability.

- a) OECD should assist in the establishment and implementation of an annual *international* awards program to recognize excellence in the area of sustainable chemistry. The following elements would

be important to the successful implementation of this awards program

- the OECD Steering Group should create a work group to manage this program that would include representatives from international and regional professional societies, relevant intergovernmental organizations, non-governmental organizations (NGOs), and industrial trade associations;
 - the official presenter of the awards should be a multinational governmental body;
 - the exact nature of the nonmonetary award should be defined and established; and
 - eligible recipients of the awards can include representatives from academia, industry, government, and nongovernmental organizations.
- b) OECD should develop guidance on methods to design *national* awards and recognition programs in the area of sustainable chemistry. The workshop recognized that the essential elements of an effective international or national awards and recognition program would require
 - the award or recognition be given by a group which is highly respected by the public;
 - the award be highly visible both to the scientific and industrial communities as well as the general public; and
 - the information collected during the award nomination process (including, for example, information on the economic and environmental benefits of a particular innovative technology that incorporates the principles of sustainable chemistry), should be made available to the relevant community.

Exchange of Technical Information Related to Sustainable Chemistry

Recommendation 4: OECD should establish an information exchange activity on sustainable chemistry. To do so, OECD should

- a) identify existing communication channels;
- b) coordinate among these channels within OECD countries; and
- c) encourage development of new communication channels deemed necessary.

The purpose of this activity is to help promote the development and functioning of an international sustainable chemistry community by

- facilitating the exchange of information through established programs;
- providing enabling information to developing programs; and
- communicating program opportunities and re-

sults to both technical and nontechnical audiences.

Research and Development

Recommendation 5: While it is recognized that OECD cannot fund or carry out actual research, OECD should (1) encourage member countries to undertake sustainable chemistry research and (2) facilitate the development of effective research activities in institutions and other organizations.

- a) OECD should encourage governments to initiate research programs. The approach and specific rationale for doing so can be developed by the Steering Group or other experts as it sees fit.
- b) OECD should organize member country expert meetings to identify basic (i.e. precompetitive) research agendas to facilitate the exchange of information and experiences and to foster cooperation.
- c) OECD should monitor the implementation of and results from research programs for the purpose of improving the effectiveness of future programs.
- d) OECD should encourage national and multinational research funding organizations to increase research funding for sustainable chemistry and foster international collaborations for short- and long-term research.

Guidance on Activities and Tools to Support Sustainable Chemistry Programs

Recommendation 6: OECD should assist in the development of guidance on sustainable chemistry activities and tools to improve awareness and support of sustainable chemistry activities in member and nonmember countries.

- a) To improve awareness and adoption of sustainable chemistry, the following actions are recommended:
 - Stakeholders in sustainable chemistry should be identified and informed about the initiative. OECD should facilitate contact with international organisations, national governments, industry and trade associations, labour and trade unions, environmental and other NGO's, academia and other relevant parties.
 - SME activities in sustainable chemistry should be stimulated by engaging innovative companies, trade associations, governments, and professional associations through mentoring, education, and training of SMEs.
 - Academia, industry, governments, and other institutions should develop opportunities that support greater cooperation between the various fields of chemistry and other related disciplines (e.g., analytical chemistry, physical chemistry, engineers) on the design and

implementation of sustainable chemistry projects.

- b) Tools should be developed to support national sustainable chemistry programs. These tools could include the following:
 - developing new (or adapting existing) mechanisms for monitoring progress, exchanging information, and benchmarking; and
 - exploring, through existing OECD programs, economic incentives, including the internalization of environmental costs.
- c) National governments or others should, as appropriate, establish qualitative or quantitative targets with realistic time scales.

Sustainable Chemistry Education

Recommendation 7: OECD should promote the incorporation of sustainable chemistry concepts into chemical education (within and outside of academia) and provide support material to do so.

- a) It is recommended that approaches and material be developed that can describe and promote the benefits of sustainable chemistry education programs to:
 - the business community, through publications in relevant press, provision of material to relevant conferences/meetings, and by targeting existing programs (such as *Responsible Care*), etc.;
 - the scientific community; and
 - the public.
- b) It is recommended that OECD develop guidance on how to implement sustainable chemistry education programs based on materials from existing programs and new materials developed to meet unique needs. This guidance could involve:
 - surveying existing sustainable chemistry education programs (including experiences on what worked and what did not work);
 - identifying educational needs, including identifying barriers and drivers to meeting those needs (i.e., identify gaps);
 - developing materials to meet unique educational needs that cannot be met by existing programs (i.e., fill gaps);
 - compiling materials from existing sustainable education programs and newly developed materials, and developing guidance on how to use these materials;
 - convening educators at a workshop to more thoroughly assess the situation; and
 - disseminating the package of guidance/material (e.g., using the Internet, conferences/

meetings, continuing education programs, networks, professional societies, trade associations, media, etc.).

The IUPAC Working Party on Synthetic Pathways and Processes in Green Chemistry

At the end of the Workshop, Saturday afternoon 17th and Sunday 18th October, a meeting of the IUPAC Working Party of Commission III.2 was held. This was the second time the workgroup met from its constitution (Washington, 27 May 1998).

This Working Party was founded during the 13th IUPAC Conference on Physical Organic Chemistry (25–29 August 1996, Inchon, Korea) and formally approved by the General Assembly (Geneva, August 1997).

Workgroup Composition: P. Tundo, Chairman (Ca' Foscari University of Venice, Italy).

Members: Paul Anastas (U.S. Environment Protection Agency), Masakazu Anpo (Osaka Prefecture University, Japan), Terrance Collins (Carnegie Mellon University, USA), Werner Klein (IUCT, Germany), Tomasz Modro (University of Pretoria, South Africa), Martin Poliakoff (University of Nottingham, UK), William Tumas (Los Alamos National Laboratory, USA).

This group operates in collaboration with the IUPAC Division Chemistry and the Environment, represented by its President Prof. J. Miyamoto, and with the Committee for Chemistry and Industry (COCI), represented by Prof. G. Martens (SOLVAY s.a., Belgium).

The first aim of the meeting was to create a network of single IUPAC initiatives in the field of sustainable chemistry among the CHEMRAWN Committee and the Subcommittee on Synthesis of the Organic Division.

It was decided to propose to organize a joint meeting together at the General Assembly in Berlin (August 1999).

The Working Party agreed that they needed to help define the general concept of green-sustainable chemistry to ensure that leading scientists are attracted to the area.

The Working Party agrees upon the set of goals to be achieved as outlined in the following four points:

1. impact and awareness heightening of the chemical community
2. informational linkage of green chemistry initiatives and efforts
3. international political and funding impact
4. standardization and formalization of definitions and principles of Green Chemistry

While there is a high level of activity in the new

field of green chemistry, a large portion of the chemistry community is still unfamiliar with the principles, methods, and definitions that are a fundamental part of this new area.

Throughout the world currently, there are government programs and policies in green chemistry being developed independently and in collaboration with the chemical industry and academia. The need for scientific input and a scientific framework in green chemistry by an international scientific body is necessary in order to inform the decisions of the policy makers and program directors.

The role of IUPAC as the scientific body for definition and standardisation will be particularly useful as OECD incorporates the work products of the green chemistry Working Party into the implementation phases of its sustainable chemistry initiative. Moreover, this interaction is an example of a particular benefit to IUPAC. A green chemistry focus will strengthen IUPAC because the potential of the field for beneficial social impacts provides a unifying force that positively couples the mission of IUPAC to other international bodies such as OECD.

The main purpose of the two-day meeting of the IUPAC Working Party, was to define the products of this group. A number of key issues were discussed and decisions were made on what the technical products will be.

The goal of these products was two-fold: 1) to communicate green or sustainable chemistry concepts more broadly to the chemical community (industry and academia) and 2) to enhance the image of chemistry to the broader community through a lay-type publication. The main motivation of these products arises from what needs to be done to promote green chemistry and how to show that it is a new worldwide approach distinct from other concepts for environmental protection. These products are apparently very important for advancing the global nature of this concept, given the important issues at the OECD workshop.

For its major product, the Working Party will attempt to prepare a cogent product (report or progress report) on green chemistry to be submitted by Commission III.2 during the Berlin General Assembly, with the following outline:

- I The Concept of Design
- II Sustainability and the Role of Chemistry (Energy and Materials)
- III Evolution of Chemical Problems and Solutions.
- IV Evolution of Risk Management (Processes as well as Products)
 - Disposal
 - Treatment
 - Recycle and Reuse

- Pollution Prevention
 - Process Intensification.
- V Definition of Green Chemistry
- New Approach to Risk Reduction
 - Concept of Intrinsic Hazard
- VI Principles of Green Chemistry
- VII Economic Considerations
- VIII Recommendations for Fundamental Research Needs.

As scientific products are concerned, the Working Party decided to submit a proposal for a special issue on Chemistry for the Environment to be published in IUPAC's journal *Pure and Applied Chemistry*.

Other products will be:

1. Prepare and manage an Internet home page on the subject within the IUPAC web site.
2. Advertise the activities of the Working Party in the major scientific journals.

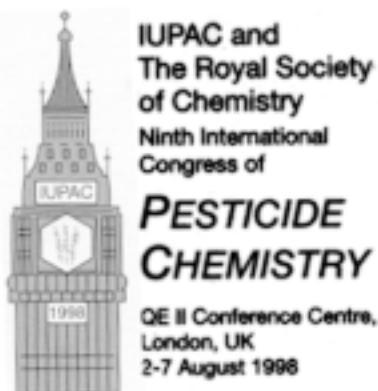
P. Tundo

9th IUPAC International Congress of Pesticide Chemistry 2–7 August 1998, London, United Kingdom

The prestigious Queen Elizabeth II Conference Centre in London was the venue of the 9th IUPAC International Congress of Pesticide Chemistry. The Congress, sponsored by IUPAC and organized by the Royal Society of Chemistry, was attended by over 1,700 delegates from 58 countries worldwide.

Historically this Congress is held every 4 years and has previously been held in Israel, Finland, Switzerland, Japan, Canada, Germany, and during 1994 in Washington DC, USA.

The Congress theme for 1998 was "The Food and Environment Challenge", reflecting the problem of feeding the ever increasing world population in the next millennium while also meeting the high demands



Dr. John Finney, Chairman of the Executive Committee

for environmental quality and a safe food supply. The Congress was opened on 2 August with a welcome from the Chairman of the Executive Committee, John Finney, and by Dr. Junshi Miyamoto, President of the IUPAC Division of Chemistry and the Environment. Dr. Miyamoto briefly explained the organisation and role of IUPAC and in particular the formation of the new Division of Chemistry and the Environment.

The theme of the Congress was pursued at the opening ceremony by two plenary lectures from Dr. D. Evans, Zeneca Agrochemicals, and Professor Sir Colin Berry, UK Advisory Committee on Pesticides. In his lecture entitled "How can technology feed the world safely and sustainably", Dr. Evans told the assembled audience that with the expectation that the world's population would double in the next 50 years, combined with the requirement for greater food quality and variety, an integrated approach using all forms of technology will be crucial to provide safe food while ensuring sustainability. He went on to say that we are currently witnessing a significant change in crop protection. The organic chemists are exploiting advances in combinatorial chemistry and robotics, and the biologists are designing high-throughput screens dedicated to finding new chemistries that are effective at low-use rates and are environmentally and toxicologically benign. Dr. Evans also recognized the impressive progress made in the area of bioscience and the positioning of transgenic crops: he did, however, emphasize the importance of public debate and freedom of choice for consumers.

Professor Sir Colin Berry, in his lecture entitled "Caution, precaution, and indemnity", continued the theme of food and food safety, looking primarily at regulation. Professor Berry told the audience that the variety, quality, and quantity of food currently available has improved significantly over the last 40 years.



Dr. Junshi Miyamoto, President of the IUPAC Division of Chemistry and the Environment

He indicated that many problems in food production and preparation are microbiological, yet despite this reason it is the chemicals in food, many of which are added to prevent microbiological problems, that cause consumer anxiety and hence increase regulation. Professor Berry presented several examples highlighting how the pesticide industry is affected by health concerns that are in many cases illogical when compared to other normal household activities. In summing up, Professor Berry reminded the audience that regulation clearly does increase safety, but it does not in itself generate safety. All regulations should be formulated using a risk–benefit analysis.

The Congress itself revolved around eight main topics representing all the phases of pesticides invention through registration. Each of the main topics comprised four or five plenary lectures supported by five related poster sessions each with an associated workshop. The main topics were:

1. Synthesis and Structure Activity Relationships
2. Delivery
3. Natural Products
4. Mode of Action
5. Metabolism
6. Environmental Fate
7. Residues in Food and the Environment
8. Regulation and Risk Assessment

The plenary lectures were given by leading authorities in the individual subject areas and chosen to provide new insights and to provoke discussion that could be further taken up in the poster sessions and workshops.

Over 1,000 posters were presented at the Congress and, combined with subsequent workshops, provided a forum for scientific debate.

This event is a highlight in the Pesticide Chemistry

diary, bringing together practitioners from a wide range of disciplines and facilitating both broad-based and specific discussions.

The next Congress, the 10th, will be held in Basel Switzerland in August 2002, and will be organized by the New Swiss Chemical Society and the Swiss Society of Chemical Industries. The theme of the Congress will be “Innovative Solutions for Healthy Crops”.

M. Skidmore
Commission of Agrochemicals and the Environment VI.4.

Special Panel Discussion Session at the 9th International Congress of Pesticide Chemistry

The Role of Publicly Funded Research in the Risk Assessment and Registration of Pesticides

The 9th Congress offered an opportunity for university and government pesticide scientists from around the world to compare experiences of their funding situations, in a special session organized while the Congress was in progress. Organizers informally asked nine scientists from seven countries to address the questions:

- Is there a real decline in publicly supported research on conventional pesticides? In what areas?
- What is the purpose and justification for publicly supported research on conventional pesticides?

The resulting discussion and audience response indicate that nonindustry research on commercial pesticide behavior and fate in the environment is declining worldwide, and that the decline is reaching levels that endanger the credibility of the risk assessment process “social contract.”

Scientists from the United States, Canada, Hungary, Egypt, and Israel (invitees from Germany and the UK were unable to attend the session) described how declining numbers of pesticide scientists in the public sector are making it more and more difficult to achieve adequate peer review of the science presented by industry in support of registrations of pesticides. Redirection of scientists to alternative pest control research, a general public aversion to the word “pesticide” and a widely held but erroneous belief that commercial pesticides will shortly be replaced by alternatives has resulted in budget cuts, declining student enrollments, and nonreplacement of retiring scientists. Several scientists described how fundamental research on pesticide environmental impact (with the exception of endocrine disruption) is having to be “bootlegged”. Yet such fundamental research is needed to improve the

risk assessment of pesticides.

“Science is a public process,” said one of the organizers. “The risk of pesticides must be determined by the best science available, but the process is increasingly being done in-house by the industry, with review only under “proprietary data” rules by regulatory agencies that are short-handed and desperate for third-party reviewers of the process. When there were many smaller pesticide companies, many of them depended on university and agency scientists to help them with their research. That is becoming rare, leading to a situation where the nonindustry scientists able to peer-review the industry’s research are disappearing.”

The IUPAC Commission on Agrochemicals and the Environment has begun a study of the problem, entitled “Trends in research on agrochemicals: do we have the critical mass of open science (publication) needed to both advance the basic science of crop protection and to protect the public and the environment?” Commission members from nine countries have agreed to report on how their countries are dealing with this issue.

Scientists involved in pesticide regulation and risk analysis are invited to communicate their perspectives and comments to the Project Chairman, R. Don Wauchope, USDA-Agricultural Research Service, P.O. 746, Tifton, GA 31794 USA or via e-mail at don@tifton.cpes.peachnet.edu.

The 9th International Symposium on Novel Aromatic Compounds (ISNA-9) 2–7 August 1998, Hong Kong

The chemistry department of the Chinese University of Hong Kong (CUHK) hosted the 9th International Symposium on Novel Aromatic Compounds (ISNA-9), 2–7 August 1998, at the Hong Kong Convention and Exhibition Center in Wanchai, Hong Kong. ISNA-9 was organized under the joint auspices of the Hong Kong Institution of Science and the Hong Kong Chemical Society.

Aromatic compounds are those compounds that, owing to particular arrangements of their p-electrons, possess unusual chemical, physical, and biological properties. The wide spectrum of aromatic compounds today ranges from high potency pharmaceuticals to high-tech materials with special electronic, optical, and magnetic responses. Some of these materials even mimic the functions of enzymes in biological systems.

The Symposium is the first international conference held in Hong Kong sponsored by the International Union of Pure and Applied Chemistry (IUPAC), with the aim to promote fellowship and to enhance communication and professional contact among chemists actively involved in the study of novel aromatic

compounds. The international conference is also one of the programs celebrating CUHK’s 35th anniversary in 1998. This event attracted over 250 participants, of which over 200 were from overseas.

The ISNA-9 Opening Ceremony was held on 3 August 1998. Officiating was Professor Arthur K. C. Li, Vice Chancellor of CUHK. Professor Cun-Hao Zhang, Chairman of the National Natural Science Foundation of China and Official Representative of IUPAC, gave the congratulatory speech on behalf of Professor Joshua Jortner, President of IUPAC.

On 4 April 1996, Professor Tetsuo Nozoe departed this life just a month before his 94th birthday. His death marked the end of an era of organic chemistry, not simply in Japan, but worldwide among the community of ISNA chemists. His involvement with, and commitment to, the ISNA movement is legendary. Professor Nozoe was the Founding Chairman of ISNA at the age of 68, and the inaugural meeting took place in Sendai, Japan, 24–28 August 1970. Because of his stature within the ISNA family, the passing of this legendary figure is to be marked by an ISNA Nozoe Memorial Lecture. Professor Lawrence T. Scott of Boston College, a renowned scholar in the field of novel aromatic compounds, was chosen by an International Selection Panel comprising Professors Sho Ito, Ichiro Murata, Toyonobu Asao, Ron Breslow, Klaus Hafner, Emanuel Vogel, and Brian Halton to deliver the first Nozoe Memorial Lecture entitled “Geodesic Polyarenes with Exposed Concave Surfaces” on 3 August 1998.

Besides the Nozoe Memorial Lecture, there were also 12 plenary lectures, 25 invited lectures and poster sessions with over 150 posters given by leading professional chemists the world over. Some of the most notable plenary lectures were: Professor Hiizu Iwamura discussed his molecular approaches towards photomagnetic materials; Professor Hisashi Yamamoto spoke on selective organic synthesis, making use of his designer Lewis acids; Professor Fritz Voegile told the audience about the chemistry of topological chirality; Professor François Diederich disclosed his preparation of functional conjugated materials for optonics and electronics; Professor Klaus Müllen showed how he made two- and three-dimensional nanoparticles from benzene. In addition to several ISNA veterans, such as Professors Brian Halton, Koichi Komatsu, Reg Mitchell, Fritz Bickelhaupt, Modcai Rabinovitz, and Heinz Staab, some rising stars of the ISNA family, such as Professors Mike Haley, Peter Timmerman, Yves Rubin, and Tim Swager, also summarized their recent research findings in invited lectures.

H. N. C. Wong
C-H. Zhang

Provisional Recommendations

IUBMB-IUPAC Joint Commission on Biochemical Nomenclature (JCBN)

Nomenclature of Lignans and Neolignans

Lignans and neolignans are a large group of natural products characterized by the coupling of two C_6C_3 units. For nomenclature purposes the C_6C_3 unit is treated as propylbenzene and numbered from 1 to 6 in the ring, starting from the propyl group, and with the propyl group numbered from 7 to 9, starting from the benzene ring. With the second C_6C_3 unit the numbers are primed. When the two C_6C_3 units are linked by a bond between positions 8 and 8' the compound is referred to and named as a lignan. In the absence of the C-8 to C-8' bond, and where the two C_6C_3 units are linked by a carbon-carbon bond it is referred to and named as a neolignan. The linkage with neolignans

may include C-8 or C-8'. Where there are no direct carbon-carbon bonds between the C_6C_3 units and they are linked by an ether oxygen atom the compound is named as an oxyneolignan. The nomenclature provides for the naming of additional rings and other modifications following standard organic nomenclature procedures for naming natural products. Provision is included to name the higher homologues. The sesquieneolignans have three C_6C_3 units and dineolignans have four C_6C_3 units.

Comments by 30 June 1999

To Prof. G. P. Moss

Department of Chemistry

Queen Mary and Westfield College

Mile End Road, London E1 4NS, United Kingdom

Tel: +44 (171) 775 3262

Fax: +44 (181) 981 8745

E-mail: g.p.moss@qmw.ac.uk

Conference Announcements

14th International Symposium on Plasma Chemistry (ISPC) 2-6 August 1999, Prague, Czech Republic

General Information

The ISPC is a biennial international conference, the last conference having been held in Beijing in 1997. The ISPC encompasses the whole area of plasma chemistry. Topics will range from the basic physics and chemistry of thermal and low-pressure plasmas to industrial processes, processing techniques, and equipment. The conference should enable the exchange of information and ideas between plasma chemistry basic/applied researchers and industrial practitioners of plasma-processing technology. The ISPC will consist of a five-day Symposium incorporating a Plasma Equipment Exhibition, preceded by a three-day Summer School on plasma chemistry and followed by a one-day Workshop on Industrial Applications of Plasma Processing.

Symposium

The 14th International Symposium on Plasma Chemistry will be held in Prague, capital of the Czech Re-

public, 2-6 August 1999. The Symposium will consist of plenary lectures covering the entire field, a series of parallel oral sessions (with invited and contributed papers), and poster sessions. The whole field of plasma chemistry and plasma processing, both in thermal and low-pressure plasmas, will be covered. The subjects will range from the fundamental studies of these plasmas to applications and engineering of plasma technologies.

Topics

The list of topics is preliminary; the final list will be given in the second announcement.

Basic physical and chemical processes in plasmas
Modelling and diagnostics of plasmas
Plasma generation
Plasma-particle interaction
Plasma-surface interaction
Plasma etching
Plasma CVD
Plasma synthesis
Plasma spraying
Plasma metallurgy
Environmental application
Industrial applications

Summer School

The International Summer School on Plasma Chemistry to be held prior to the Symposium, 29–31 July 1999, will consist of courses providing an introduction to the fundamentals of plasma chemistry and the applications of plasma processing. Two courses will be offered simultaneously, one on low-pressure nonequilibrium plasmas and the other on thermal plasmas. These courses are intended for students, scientists, engineers, and managers who want an introduction to, or overview of, the subject or better appreciation of the topics presented at the Symposium. There will be a separate registration fee for the Summer School.

Workshop

The workshop on Industrial Applications of Plasma Processing will be held following the Symposium, 6–7 August 1999.

The workshop will focus on recent industrial applications, developments, and concerns in thermal and low-pressure plasma processing. The workshop will enable the exchange of ideas between researchers, manufacturers, and end users. There will be a separate registration fee for the workshop.

Exhibition

A professional exhibition of equipment for plasma processing, diagnostics, instrumentation, etc. will be held during the Symposium. Firms interested in showing their products should contact the Local Organising Committee.

Venue

The Symposium Exhibition and Workshop will be held in the Congress Centre of the Prague Hilton Hotel situated just at the boundary of the old town. Accommodations will be available in the Hilton Hotel, at several hotels in the vicinity, and in student hostels.

6th International Conference on Methods and Applications of Fluorescence Spectroscopy (MAFS6), 12–15 September 1999, Paris, France

General Information

The 6th International Conference on Methods and Applications of Fluorescence Spectroscopy will be held in Paris, France, 12–15 September 1999. This Conference is organized in alternate years. The preceding conferences took place in Graz, Austria (1989 and 1991), Prague, Czech Republic (1993), Cambridge,

England (1995) and Berlin, Germany (1997).

This Conference aims at bringing together researchers working in various fields who employ fluorescence as a tool of investigation for both fundamental and applied purposes. Applications in chemistry, physics, biology, and medicine are covered.

The Conference will start on Sunday afternoon and end on Wednesday afternoon. The scientific program includes about 20 lectures and an extensive poster session, together with a commercial exhibition.

A guided visit of either the Louvre or Orsay Museums and a dinner during a boat cruise on the river Seine are planned in the social program.

List of Topics

Methods

- Fluorescent probes
- Time-resolved techniques
- Energy transfer
- Fluorescence depolarization
- Fluorescence microscopy
- Multiphoton excitation
- Single molecule detection
- Fluorescence correlation spectroscopy
- Near-field fluorescence spectroscopy

Applications

- Molecular and cellular biology
- Polymers
- Organized media
- Supramolecular systems
- Fluorescent sensors
- Clinical analysis
- Diagnostics
- Environment
- Imaging (biology, medicine)

Inquiries about MAFS6

Prof. Bernard Valeur, MAFS6, Conservatoire National des Arts et Métiers, 292, rue Saint-Martin, F-75141 Paris Cedex 03, France; Tel: +33 3 1 40 27 23 89; Fax: +3 1 40 27 23 62; E-mail: mafs6@cnam.fr; web site: <http://www.lbpa.ens-cachan.fr/photobm/mafs6>.

6th International Symposium on Hyphenated Techniques in Chromatography (HTC-6), 9–11 February 2000, The Saint John's Conference Centre, Bruges, Belgium

This international symposium will be supported by tutorials. The scientific program will comprise both oral and poster presentations. The deadline for submitting abstracts is 30 June 1999. Abstracts for last-minute poster presentations will be accepted up

to 15 December 1999.

Contact: HTC-6 Congress Secretariat, Ordibo bvba, Lucas Henninckstraat 20, B-2610 Wilrijk (Antwerp), Belgium; Tel.: +32 (3) 561 2831; Fax: +32 (3) 827 8439; e-mail: smitsr@pophost.eunet.be; home page for updated program: <http://www.ordibo.be/htc>.

World Congress of Food Science & Technology, 3–8 October 1999, Sydney, Australia

For further information contact: IUFOST Congress 10, P.O. Box 1493, North Sydney, NSW 2059, Sydney, Australia; Tel: +61 2 9959 4499; Fax: +61 2 9954 4327; E-mail: iufost10@alfst.asn.au; website: <http://alfst.asn.au>

Plutonium Futures—The Science, 10–14 July 2000, Santa Fe, New Mexico, USA

This conference, the second in a series, is designed to be an interdisciplinary forum to present and discuss current research on physical and chemical properties of plutonium and other actinide elements. This forum

will have international participation to discuss current and emerging science (chemistry, physics, materials science, nuclear science, and actinides in the environment) of actinides relevant to enhancing global nuclear security. Contact K. C. Kim, K. K. S. Pillay; Tel: +1 505 667 7753; Fax: +1 505 667 7966; E-mail: puconf2000@lanl.gov, <http://www.lanl.gov/Pu2000.html>.

5th World Congress of Theoretically Oriented Chemists, (WATOC'99), 1–6 August 1999, Imperial College, London, UK

For further information see the WATOC'99 web site: <http://www.chemsoc.org/watoc'99/>.

XXIV International Symposium on Macrocyclic Chemistry (ISMC'99), 18–23 July 1999, Barcelona, Spain

For further information see the ISMC'99 web site: <http://www1.uji.es/ismc>.

New Books and Publications

New Publications from the World Health Organization

Concise International Chemical Assessment Documents (CICADs)

Concise International Chemical Assessment Documents (CICADs) are the latest in a family of publications from the International Program on Chemical Safety (IPCS), a cooperative program of the World Health Organization (WHO), the International Labour Organisation (ILO), and the United Nations Environment Program (UNEP). CICADs join the Environmental Health Criteria documents (EHCs) as authoritative documents on the risk assessment of chemicals.

CICADs are concise documents that provide summaries of the relevant scientific information concerning the potential effects of chemicals upon human health and/or the environment. They are based on selected national or regional evaluation documents or on existing EHCs. Before acceptance for publication as CICADs by IPCS, these documents undergo extensive peer review by internationally selected experts to ensure their completeness, accuracy in the way in

which the original data are represented, and the validity of the conclusions drawn.

The primary objective of CICADs is characterization of hazard and dose-response from exposure to a chemical. CICADs are not a summary of all available data on a particular chemical; rather, they include only that information considered critical for characterization of the risk posed by the chemical. The critical studies are, however, presented in sufficient detail to support the conclusions drawn. For additional information, the reader should consult the identified source documents upon which the CICAD has been based.

Risks to human health and the environment will vary considerably depending upon the type and extent of exposure. Responsible authorities are strongly encouraged to characterize risk on the basis of locally measured or predicted exposure scenarios. To assist the reader, examples of exposure estimation and risk characterization are provided in CICADs, whenever possible. These examples cannot be considered as representing all possible exposure situations, but are provided as guidance only. The reader is referred to EHC 170 for advice on the derivation of health-based guidance values.

While every effort is made to ensure that CICADs represent the current status of knowledge, new information is being developed constantly. Unless otherwise stated, CICADs are based on a search of the scientific literature to the date shown in the executive summary. In the event that a reader becomes aware of new information that would change the conclusions drawn in a CICAD, the reader is requested to contact the IPCS to inform it of the new information.

Procedures

The procedures followed to produce a CICAD are designed to take advantage of the expertise that exists around the world—expertise that is required to produce the high-quality evaluations of toxicological, exposure, and other data that are necessary for assessing risks to human health and/or the environment.

The first draft is based on an existing national, regional, or international review. Authors of the first draft are usually, but not necessarily, from the institution that developed the original review. A standard outline has been developed to encourage consistency in form. The first draft undergoes primary review by IPCS to ensure that it meets the specified criteria for CICADs.

The second stage involves international peer review by scientists known for their particular expertise and by scientists selected from an international roster compiled by IPCS through recommendations from IPCS national contact points and from IPCS participating institutions. Adequate time is allowed for the selected experts to undertake a thorough review. Authors are required to take reviewers' comments into account and revise their draft, if necessary. The resulting second draft is submitted to a Final Review Board together with the reviewers' comments.

The CICAD Final Review Board has several important functions:

- to ensure that each CICAD has been subjected to an appropriate and thorough peer review;
- to verify that the peer reviewers' comments have been addressed appropriately;
- to provide guidance to those responsible for the preparation of CICADs on how to resolve any remaining issues if, in the opinion of the Board, the author has not adequately addressed all comments of the reviewers; and
- to approve CICADs as international assessments.

Board members serve in their personal capacity, not as representatives of any organization, government, or industry. They are selected because of their expertise in human and environmental toxicology or because of their experience in the regulation of chemicals. Boards are chosen according to the range of expertise required for a meeting and the need for balanced geographic representation.

The two most recent CICADs are No. 8, Triglycidyl Isocyanurate and No. 9, N-Phenyl-1-naphthylamine. These and other monographs in the series are available from the World Health Organization, CH-1211 Geneva 27, Switzerland, Fax: +41 22 791 4857.

The COSTED Occasional Paper Series

This series is an effort towards influencing public policy in grappling with diverse and complex issues that cannot be ignored in the path to sustainable national development. The series addresses topics which have a bearing on science and technology and is specially targeted at policy makers and governments in developing countries. Each paper is authored by experts of international standing, with experience in and concern for development issues. Four papers are expected to be published annually and widely disseminated. Copies of these papers may be obtained on request to the COSTED International Secretariat.

The following publications can be obtained from the COSTED Central Secretariat, 24, Gandhi Mandapam Road, Chennai - 600 025 India. Tel.: +91 44 4901367; Fax: +91 44 4914543; E-mail: costed@giasmd01.vsnl.net.in;

COSTED Occasional Paper No. 1: Communicating with the Public, Politicians, and the Media

Juan G Roederer, Geophysical Institute, University of Alaska-Fairbanks. July 1998.

There is widespread concern about the low visibility of science and technology among the public and, more importantly, the decision makers. While the reasons for this concern may be attributed to cultural, political, and social factors, the fact remains that science and technology is a vital instrument that must be interwoven into the development agenda of every country, big or small, developed or underdeveloped. A recent survey by the International Council for Science (ICSU) revealed that more and more young people are opting for careers other than science. This could lead to an alarming scenario, where the practitioners and implementers of science and technology research would become a vanishing tribe.

Dr. Juan Roederer, Professor of Physics Emeritus at the University of Alaska, was invited to write this monograph for COSTED, recognising his long and rich experience in science policy and consultative status on science and technology for national governments in developing countries. He nurtures a deep concern for enhancing the voice and visibility of science, especially in developing countries, and believes that this is best done by targeting and influencing the younger generation.

This paper offers a set of guiding principles on the do's and don'ts for the practitioners of science while

communicating with the public, the polity, and the media. Written in a delightfully practical style, the paper points out common misconceptions and attitudinal barriers towards making more effective use of science. This paper is a sincere effort to help scientists demystify science to the common man and to help decision makers harness the potential of this vital tool for human welfare.

COSTED Occasional Paper No. 2: Global Environmental Good: A Socio-Ethical Compulsion in the 21st Century

Ranjan R. Daniel, July 1998.

The impact of human developmental activities on the earth's environment has received wide-ranging attention from the media, public, science and technology community, policy makers, government, and development and donor agencies. During the past quarter-century or so, no other issue has assumed such a global dimension and significance for the human race.

A number of landmark events aimed at checking and mitigating the effects of human activities on the environment have occurred. The Rio Conference, World Climate Research Program, the International Geosphere-Biosphere Program and recently, the Kyoto Conference, have all examined the complex dimensions of environmental consequences. The human dimension of the problem has gained increasing visibility and concern.

Notwithstanding the systematization of scientific understanding of the earth system and its processes, of human impact on the environment, and the formulation of regulatory protocols, it is imperative to recognize an element of moral and ethical compulsion to maintain the environment for ensuing generations. This present paper focuses on this aspect.

Prof. R.R. Daniel, former Scientific Secretary of COSTED, has a rich and long experience in development issues and global environmental concerns. He spearheaded a number of national, regional, and local missions in enhancing awareness and preparedness to meet the challenges of these complex environmental issues. In this paper, Prof. Daniel recapitulates the global scenarios related to environmental concerns and the various developments and movements aimed at international and regional cooperation. He reviews international policy after the Rio Conference and advocates a new socio-ethical and moral compulsion for global well being.

COSTED Occasional Paper No. 3: Scientific Journal Publishing in the Developing World?

Ana Maria Cetto, Instituto de Fisica, Universidad Nacional, Autónoma de Mexico. July 1998.

Scientific publications are a good indication of the

intellectual effort of every science and technology community. It is popularly said that without publications science is dead.

Scientific publications serve as an instrument for information dissemination, as building blocks for furtherance of research, as the basis for scientific research and inquiry, and above all provide potential for application through technical and industrial innovation.

As in every other sphere, there is a yawning gap in the quantity of scientific literature that emanates from the developed and the developing countries. It is interesting to analyze why this is so; more importantly, the impetus for publishing in the developing world is not strong enough to reflect the results of scientific effort in the printed form. At the same time, there is a significant volume of undocumented knowledge and wisdom handed down to the generations by word of mouth. In the present era of competing intellectual property rights and the exploitation of knowledge for wealth generation, this issue gains a special relevance and importance.

Prof. Ana Maria Cetto, a Senior Professor of Physics at UNAM, Mexico and former Vice Chair of the COSTED Executive Committee, has a deeply committed association to the cause of strengthening scientific publications in the developing world. She has organized several activities aimed at enhancing the visibility, quality, quantity, and the impact of scientific publication emanating from the developing world. In this paper she surveys the status of scientific publications around the world and the distinct disparities in the developing world. As a typical example, she examines the critical issues that confront the Latin American region and recommends examples of initiatives to strengthen scientific publishing.

This publication is most timely and appropriate and is aimed specifically at developing countries that possess enormous science and technology manpower and research efforts, but are unable to translate all of them into the printed media. It is hoped that the book will serve as a guideline for scientific institutions, regional bodies, and policy makers on the importance of documented information for economic application and industrial innovation.

COSTED Occasional Paper No. 4: Gearing up for the Efficient Management of Intellectual Property

Rights in the 21st Century

N. R. Subbaram, Consultant (IPR), with contributions from G. Thyagarajan, Scientific Secretary, COSTED. July 1998.

In recent years many countries have liberalized and globalized their economies. Many countries, like India, are in the process of opening up their economies. Consequently, new competitive pressures have arisen

in these countries, particularly the developing countries. The definition of competition itself has now undergone a change. It is being increasingly acknowledged that the competitiveness of an enterprise and its ability to capture the market depends largely on its ability to manage the "internal" environment for developing innovative technologies. Furthermore, technology is also increasingly becoming a valuable com-

mercial or tradable asset and a dominating factor in determining competitiveness.

In order to develop newer technologies and promote inventiveness, it is essential to invest heavily in research and development (R&D). Investment costs in R&D are also increasing rapidly along with the competitiveness. Protection of the results of R&D gains importance under the circumstances.

Conference Calendar

Visit <http://www.iupac.org> for complete information and further links

1999

Functional Dyes

31 May–4 June 1999

4th International Symposium on Functional Dyes, Osaka, Japan.
Prof. Yasuhiko Shirota, Faculty of Engineering, Osaka University, Yamadaoka, Suita, Osaka 565-0871, Japan.

Tel.: +81 6 879 7364

Fax: +81 6 877 7367

E-mail: isfd@chem.eng.osaka-u.ac.jp

Polymer Systems

7–10 June 1999

3rd International Symposium on Molecular Mobility and Order in Polymer Systems, St. Petersburg, Russia.

Prof. A. A. Darinskii, Chairman; Mrs. I. Kovalenko, Coordinator; Institute of Macromolecular Compounds, Bolshoy pr. 31, St. Petersburg, 190004 Russia.

Tel.: +7 812 213 2907

Fax: +7 812 218 6869

E-mail: IMC@macro.spb.su

Biodiversity and Bioresources

11–15 July 1999

2nd International Conference on Biodiversity and Bioresources—Conservation and Utilization, Belo Horizonte, Minas Gerais, Brazil.

Prof. Alaide Braga de Oliveira, Faculdade de Farmacia—UFMG, Av. Olegario Maciel 2360, 30.180-112 Belo Horizonte,

Brazil.

Fax: +55 31 337 9076

E-mail:

fernao@dedalus.lcc.ufmg.br

Polymerization Methods

12–15 July 1999

39th Microsymposium, Advances in Polymerization Methods: Controlled Synthesis of Functionalized Polymers, Prague, Czech Republic.

Dr. Jaromir Lukas, Institute of Macromolecular Chemistry, Academy of Sciences of the Czech Republic, Heyovskeho na. 2, 162 06 Praha 6, Czech Republic.

Tel.: +420 2 360341

Fax: +420 2 367981

E-mail: sympo@imc.cas.cz

CHEMRAWN

20–25 June 1999

CHEMRAWN XII—African Food Security and Natural Resource Management: The New Scientific Frontiers, Nairobi, Kenya.

Dr. Pedro Sanchez, International Center for Research in Agroforestry, P.O. Box 30677, Nairobi, Kenya.

Tel.: +254 2 521003

Fax: +254 2 520023

E-mail: p.sanchez@cgnet.com

Memorial K. I. Zamaraev

28 June–2 July 1999

International Memorial K. I. Zamaraev Conference on Physical Methods for Catalytic

Research at the Molecular Level, Novosibirsk, Russia.

Prof. V. N. Parmon, Boreskov Institute of Catalysis, 5, Prosp. Akad. Lavrentieva, Novosibirsk, 630090, Russia.

Tel.: +7 3832 343269

Fax: +7 3832 343056

E-mail: parmon@catalysis.nsk.su

Advanced Materials

14–18 July 1999

1st IUPAC Workshop on New Directions in Chemistry. Workshop on Advanced Materials: Nanostructured Systems (IUPAC-WAM-1), Hong Kong.

Prof. M. A. El-Sayed, School of Chemistry and Biochemistry, Georgia Institute of Technology Atlanta, GA 30332-0400, USA.

Tel.: +1 404 894 0292

Fax: +1 404 894 0294

E-mail: mostafa.el-

sayed@chemistry.gatech.edu

How to Apply for IUPAC Sponsorship

To apply for IUPAC sponsorship, conference organizers should complete an Advanced Information Questionnaire (AIQ). The AIQ form is available at <http://www.iupac.org> or by request at the IUPAC Secretariat, and should be returned between 2 years and 12 months before the conference. Further information on granting sponsorship is included in the AIQ and available online.

Organo-Metallic Chemistry

18–22 July 1999
10th International Symposium on
Organo-Metallic Chemistry
Directed Towards Organic
Synthesis (OMCOS 10),
Versailles, France.

*Prof. J. P. Genet, Laboratoire de
Synthese Selective Organique et
Produits Naturels, E.N.S.C.P.—
UMR CNRS 7573, 11 rue Pierre
et Marie Curie, 75231 Paris
Cedex 05, France.*

Tel.: +33 1 44 276743

Fax: +33 1 44 071062

E-mail: genet@ext.jussieu.fr

Carotenoids

18–23 July 1999
12th International Symposium on
Carotenoids, Cairns, Australia.

*Prof. George Britton, School of
Biological Sciences, The Univer-
sity of Liverpool, Crown Street,
Liverpool, L69 3BX, UK.*

Fax: +44 (151) 794 4349.

Rheology of Polymer Systems

19–22 July 1999
19th Discussion Conference on
the Rheology of Polymer
Systems, Prague, Czech Repub-
lic.

*Dr. Jaromir Lukas, Institute of
Macromolecular Chemistry,
Academy of Sciences of the
Czech Republic, Heyovskeho na.
2, 162 06 Praha 6, Czech
Republic.*

Tel.: +420 2 360341

Fax: +420 2 367981

E-mail: sympo@imc.cas.cz

Ionic Polymerization

19–23 July 1999
International Symposium on
Ionic Polymerization, Kyoto,
Japan.

*Dr. Shiro Kobayashi, Depart-
ment of Materials Chemistry,
Graduate School of Engineering,
Kyoto University, Kyoto 606-01,
Japan.*

Tel.: +81 75 753 5608

Fax: +81 75 753 4911

*E-mail: kobayashi@mat.polym.
kyoto-u.ac.jp*

Analytical Science

25–30 July 1999
Analytical Science into the Next
Millennium (SAC 99), Dublin,
Ireland.

*Prof. Malcolm R. Smyth, Faculty
of Science, Dublin City Univer-
sity, Dublin 9, Ireland.*

Tel.: +353 1 704 5308

Fax: +353 1 704 5032

E-mail: smythm@ccmail.dcu.ie

Solution Chemistry

26–31 July 1999
XXVI International Conference
on Solution Chemistry, Fukuoka
City, Kyushu, Japan.

*Prof. Hitoshi Ohtaki, Depart-
ment of Chemistry, Faculty of
Science and Engineering,
Ritsumeikan University, 1-1-1
Noji-Higashi, Kusatsu 525,
Japan.*

Tel.: +81 775 61 2777

Fax: +81 775 61 2659

E-mail:

ohtaki@bkc.ritsumei.ac.jp

Plasma Chemistry

2–6 August 1999
14th International Symposium on
Plasma Chemistry, Prague, Czech
Republic.

*Prof. M. Hrabovský, Institute of
Plasma Physics, Za Slovankou 3,
P.O. Box 17, 182 21 Praha 8,
Czech Republic.*

Tel.: +420 2 824751

Fax: +420 2 8586389

E-mail: hrabov@ipp.cas.cz

IUPAC General Assembly

7–13 August 1999

IUPAC Secretariat.

Tel.: +1 919 485 8700

Fax: +1 919 485 8706

E-mail: secretariat@iupac.org

IUPAC Congress

14–19 August 1999
Frontiers in Chemistry: Molecu-
lar Basis of the Life Sciences,
Berlin, Germany.

*Gesellschaft Deutscher
Chemiker– GDCh, PO Box 90 04
40, 60444 Frankfurt Am Main,
Germany.*

Tel.: +49 69 7917 358/360/366

Fax: +49 69 7917 475

E-mail: tg@gdch.de

Colloquium Spectroscopicum Internationale

5–10 September 1999
31th Colloquium
Spectroscopicum Internationale
1999, Ankara, Turkey.

*Prof. Dr. O. Yavuz Ataman,
Department of Chemistry, Middle
East Technical University, TR-
06531 Ankara, Turkey.*

Tel.: +90 312 210 3232

Fax: +90 312 210 1280

E-mail:

xxixcsi@rorqual.cc.metu.edu.tr

Macromolecule-Metal Complexes

6–10 September 1999
8th International Symposium on
Macromolecule-Metal Com-
plexes (MMC-VII), Tokyo,
Japan.

*Prof. Eishun Tsuchida, Depart-
ment of Polymer Chemistry
Waseda University Toyko 169-50,
Japan.*

Tel.: +81 3 5286 3120

Fax: +81 3 3209 5522

E-mail:

w169988@mn.waseda.ac.jp

Organic and Organoelement Chemistry

7–11 September 1999
Horizons of Organic and
Organoelement Chemistry, to the
memory of Prof. A. N.
Nesmeyanov, on the 100th
anniversary of his birth, Moscow,
Russia.

Prof. Y. N. Bibnov, INEOS,

Vavilov str. 28, Moscow.
Tel.: +7 (095) 135 6165
Fax: +7 (095) 135 5085
E-mail: dir@ineos.ac.ru

Toxicology

6–10 November 1999
4th Congress of Toxicology in
Developing Countries, Antalya,
Turkey.
Prof. Semra Sardas, Gazi
University, Faculty of Pharmacy
Toxicology Department, TR
06330 Ankara, Turkey.
Tel./fax: +90 312 212 30 09
E-mail: ek03-k@tr-net.net.tr

2000

Bio-organic Chemistry

30 January–4 February 2000
5th IUPAC Symposium on Bio-
Organic Chemistry (ISBOC-V),
New Delhi, India.
Prof. S. Ranganathan,
Biomolecular Research Unit,
Regional Research Laboratory,
Trivandrum 695 019, India.
Tel.: +91 471 491 459
Fax: +91 471 490 186

High Temperature Materials Chemistry

4–10 April 2000
10th International Conference on
High Temperature Materials
Chemistry, Aachen, Germany.
Prof. K. Hilpert,
Forschungszentrum Jülich GmbH,
Institut für Werkstoffe der
Energietechnik (IWE 1), 52425
Jülich, Germany.
Tel.: +49 2461 61 3280
Fax: +49 2461 61 3699
E-mail: k.hilpert@fz-juelich.de

Mycotoxins and Phycotoxins

21–25 May 2000
10th International IUPAC
Symposium on Mycotoxins and
Phycotoxins, Sao Paulo, Brazil.
Dr. Myrna Sabino, Instituto
Adolfa Lutz, AV Dr. Arnaldo 355,
Sao Paulo, Brazil, 01246-902.

Fax: +455 (11) 853 3505
E-mail: Myrna@Sti.COM.BR

Organic Synthesis

1–5 July 2000
13th International Conference on
Organic Synthesis (ICOS-13),
Warsaw, Poland.
Prof. M. Chmielewski, Institute of
Organic Chemistry, Kasprzaka
44, 01-224 Warsaw 42, PO Box
58, Poland.
Tel.: +48 22 631 8788
Fax: +48 22 632 6681
E-mail: icho-s@ichf.edu.pl

Macromolecules

9–14 July 2000
38th International Symposium on
Macromolecules (MACRO
2000), Warsaw, Poland.
Prof. Stanislaw Penczek, Polish
Academy of Sciences, ul.
Sienkiewicza 112, 90363 Lodz,
Poland.
Tel.: +48 42 81 9815
Fax: +48 42 684 7126
E-mail:
spenczek@bilbo.cbmm.lodz.pl

Coordination Chemistry

9–14 July 2000
34th International Conference on
Coordination Chemistry (34-
ICCC), Edinburgh, Scotland.
Prof. P. Tasker, Chairman, Dr.
John F. Gibson, Secretary, The
Royal Society of Chemistry,
Burlington House, London W1V
0BN, UK.
Tel.: +44 171 440 3321
Fax: +44 171 734 1227
E-mail: gibsonj@rsc.org

Polymers in Medicine

17–20 July 2000
40th Microsymposium Polymers
in Medicine, Prague, Czech
Republic.
Dr. Jaromir Lukas, Institute of
Macromolecular Chemistry,
Academy of Science of the Czech
Republic, Heyovskeho na. 2, 162
06 Praha 6, Czech Republic.
Tel.: +420 2360341

Fax: +420 2367981
E-mail: sympo@imc.cas.cz

Chemical Thermodynamics

6–11 August 2000
16th IUPAC Conference on
Chemical Thermodynamics,
Halifax, Nova Scotia, Canada.
Prof. M. A. White, Department of
Chemistry, Dalhousie University,
Halifax, Nova Scotia B3H 4J3,
Canada.
Tel./Fax: +1 902 494 3894
E-mail:
Mary.Anne.White@DAL.CA

Natural Products

1 September 2000
22nd International Symposium
on the Chemistry of Natural
Products, Sao Paulo, Brazil.
Dr. M. Fátima das G.F. da Silva,
Universidade Federal de Sao
Carlos, Depto. de Química, Via
Washington Luiz, km 235,
CP676, Sao Carlos, Brazil.
Tel.: +55 16 274 8208
Fax: +55 16 274 8350
E-mail: dmfs@power.ufscar.br

Biotechnology

3–8 September 2000
11th International Biotechnology
Symposium, Berlin, Germany.
Prof. G. Kreysa, DECHEMA
eV— c/o 11th IBS, Theodor-
Heuss-Allee 25, 60486 Frankfurt/
Main, Germany.
Tel.: +49 69 7564 205
Fax: +49 69 7564 201
E-mail: info@dechema.de

Food Packaging

8–10 November 2000
2nd International Symposium on
Food Packaging—Ensuring the
Safety and Quality Food, Vienna,
Austria.
Dr. L. Contor, ILSI Europe, 83,
Avenue E. Mounier, Box 6, B-
1200, Brussels, Belgium.
Tel.: +32 (2) 762 0044
Fax: +32 (2) 771 0014
E-mail: laura@ilsieurope.be