

SUMMARY

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On the occasion of the Seventh International Chemistry Conference in Africa, 5-10 July, 1998 the current Presidents of IUPAC (Prof. Joshua Jortner) and AAPAC (Prof. E. D. Bekoe) convened a conference of African chemistry leaders with representatives of IUPAC. In the extraordinarily effective one-day meeting, held on July 11, 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 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,

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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 inter-institutional relationships rather than “hit and run” short term studies and assistance, and to realize the potential for increased regional and sub-regional 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 African Association for Pure and Applied Chemistry (AAPAC), i.e., to foster chemical research and the application of chemistry and allied sciences to capacity building in Africa is quite 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.

The 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 three produced the great majority of

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published research articles in chemistry. They were South Africa (1359 abstracts), Nigeria (384) and Kenya (97). No abstracts were cited from five countries and another twenty-one countries produced less than ten 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 nor 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 is 778 million in 1998. It 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

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substantially since 1980 with enrollment ratios in tertiary education currently at 6%, in secondary 32%, and in primary 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 non-academic 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 three hundred lecturers left Zambia during the decade 1980-90 and, unfortunately, for every two professors lost, only one was recruited. The age profile of the scientists remaining behind is not encouraging, he said. 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 great need for information technology and library development. Journals since 1975 are lacking in Zambia, as are textbooks and, especially, computers. There is 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 sub-disciplines, 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, provide for the needs of majors as well as general interest or pre-professional students. They 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.

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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, he said, 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. Difficulty is found in 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 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.

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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 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 in 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.

I. The resource base

1) Human resources: Every African country has today 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*

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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.* Commonly, raw materials are widespread within the 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. *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.*

II. The 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.*

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 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.*

III. 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 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. *As a start, African countries must break the barriers that exist between states*

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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.

IV. 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, he noted, 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.*

V. 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. *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 liaison between AAPAC and IUPAC by noting that the objectives 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 very young and weak in resources. IUPAC assistance to AAPAC through the IUPAC Website 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

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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 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 foundation 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 necessary and 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.

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4) *Worldwide responsibility.* It is the moral responsibility of the entire world 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, non-governmental, 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 industry 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 non-governmental 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 PC 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.

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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 world 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."