CRI/ICEIT
NEWSLETTER

VOL. 3 NO. 2 – April 1993
ISSN 0858-2793
BANGKOK, THAILAND

Chulabhorn Research Institute

INTERNATIONAL CENTRE FOR ENVIRONMENTAL AND INDUSTRIAL TOXICOLOGY (ICEIT)

CRI's ICEIT has been designated as a
"UNEP Centre of Excellence for Environmental and Industrial Toxicology"

Donation of Research Equipment from the Government of Japan to the Chulabhorn Research Institute

Her Royal Highness Princess Chulabhorn and H.E. Mr. Hiroaki Fujii, the Japanese Ambassador to Thailand, after the ceremony of handing over of equipment.

A further stage in co-operation between Japan and Thailand in the field of science and technology.

The ceremony of handing-over of equipment to the Bioscience Research Laboratories of the Chulabhorn Research Institute from the Government of Japan through the Japan International Co-operation Agency (JICA) took place on 4 February 1993 at the Chulabhorn Research Institute.

This transfer of equipment was part of a 178 million baht project grant extended to CRI by the Government of Japan. The project is aimed to assist CRI to achieve its goals by providing research equipment to the bioscience laboratories in CRI and thus assisting in the Institute's research activities.

Items of equipment that formed part of the donation include an Automated Protein Synthesizer for the Immunology

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Donation of Research Equipment from the Government of Japan to the Chulabhorn Research Institute

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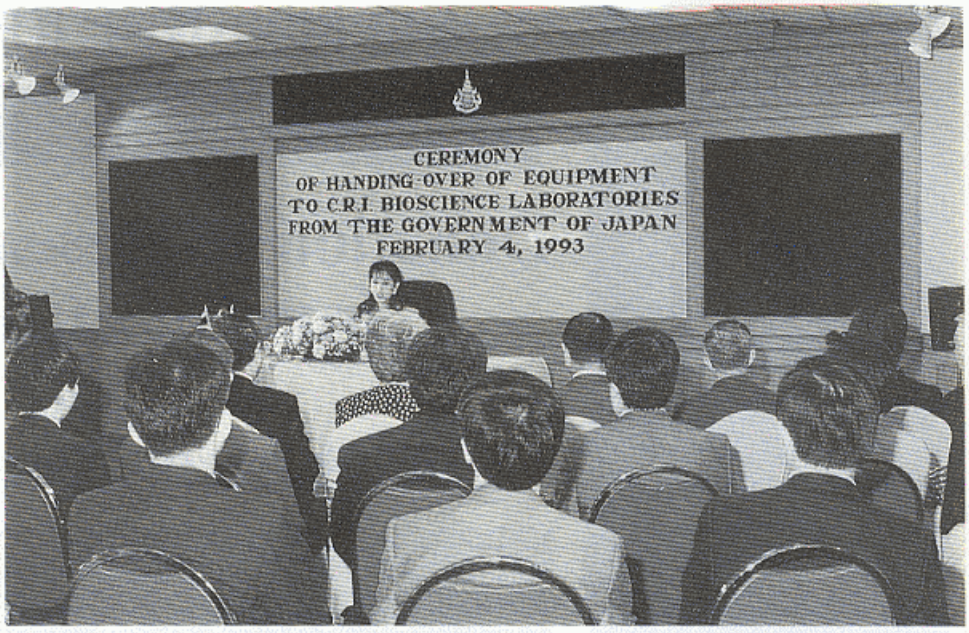
Laboratory; Electron Spin Resonance (ESR) Spectrometer, Auto Cell Counter and Calcium Analyzer for the Pathology Laboratory; Automated DNA Sequencer, Automated Peptide Sequencer, and PCR Machine for the Biotechnology Laboratory; Respiratory Mechanics Analyzer for the Pharmacology Laboratory; High Performance Liquid Chromatograph (HPLC) for the Biochemistry Laboratory; and GC-Mass Spectrometer, Liquid Scintillation Counter, and Gamma Counter for the Environmental Toxicology Laboratory.

The text of HRH Princess Chulabhorn's address on accepting the bioscience research equipment donated by the Government of Japan is summarized below.



In her address, Her Royal Highness Princess Chulabhorn expressed appreciation to the Government of Japan for the significant contribution made to the work of the Chulabhorn Research Institute through the continued support given by JICA.

One of the most important requirements for high quality scientific research is the availability of the necessary equipment and instruments to enable scientists to detect and analyze cause and effect relationships, and to monitor changes that occur, so that empirical deductions can be made confidently.

A major activity of the Chulabhorn Research Institute is biomedical research. The equipment provided by JICA has assisted the Institute in becoming fully operational in research areas that include, for example, chemical carcinogenesis and the etiology of cancer, environmental toxicology, malaria, and thalassemia.

Japanese scientists have been cooperating with the Chulabhorn Research Institute in a number of activities that enable the Institute to increase its scientific research capacity and further develop its education and training programmes.

TOXICITY OF PARAQUAT

In response to the recent article "Parkinson's Disease may be linked to Paraquat' in the CRI/ICEIT Newsletter, Vol. 2, No. 3, July 1992, which reported the chemical structures of N-methyl-4-phenyltetrahydropyridine (MPTP), a chemical recognized as producing Parkinson-like syndromes in humans, and the herbicide paraquat to be similar, and suggested that paraquat itself might be capable of inducing Parkinson's Disease because of this similarity. Dr. I.F.H. Purchase, Director of ZENECA Central Toxicology Laboratory in Cheshire, United Kingdom takes issue and offers recent experimental evidence and his view that the structures are similar; however, the chemical and biological properties are very different.

First, MPTP is an uncharged lipophilic compound in contrast to paraquat which is a water-soluble, permanently charged divalent cation. Second, MPTP is a monoamine whereas paraquat is a diamine. As a consequence of these properties, MPTP can readily penetrate through the blood brain barrier and enter the brain whereas paraquat is excluded. Once in the brain, MPTP is metabolised (1) by the enzyme monoamine oxidase B to the water-soluble, charged molecule N-methyl-4-phenylpyridine (MPP^+: structure shown in the article); paraquat is not metabolised. MPP^+ is known to be taken up into brain cell mitochondria via a specific monoamine uptake system and interferes with normal cellular processes (2). It is MPP^+, not MPTP, which is the primary neurotoxicant responsible for the induction of Parkinson-type symptoms in humans (3).

The importance of the chemical properties of these molecules and whether or not they have the ability to cross the blood-brain barrier and produce neurotoxic effects has been demonstrated in animal studies. MPP^+ dosed parenterally, for example, does not cross the blood brain barrier and cannot induce neurotoxic effects via this route (4). These differences in the chemical properties of paraquat and MPTP mean that any similarities in their chemical structures is toxicologically irrelevant. Furthermore, whilst MPTP is a useful chemical to study nigrostriatal disorders in animal models, it is recognized that the profiles of pathological lesions produced with MPTP are different from those found in Parkinson's Disease in man (3).

Evidence that paraquat does not produce Parkinson-type symptoms is found in data from animal toxicology and epidemiology studies which has been summarized by independent experts, and published by WHO (5). We have completed long-term chronic studies in dogs, rats and mice, as well as multigeneration reproduction and developmental toxicity studies. In these studies, in which the animals were monitored clinically throughout, there was no evidence for neurological changes. Clinicians involved in our own extensive epidemiology studies in Sri Lanka and the Philippines have recorded data on muscle tone, reflexes, tremors and coordination in field workers. Despite repeated exposure over many years, these workers, showed no evidence of any neurological effects from occupational exposure to paraquat.

There is no scientifically valid evidence to support the opinion that paraquat can produce Parkinson Disease-like symptoms in humans. Our current assessment of the available evidence is that paraquat is safe for humans to handle and use.

REFERENCES:

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(3) Kopin IJ, (1986). Adv Neurol 45, 137.

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NEUROLOGICAL EFFECTS OF PARAQUAT

Paraquat is a potent and widely used herbicide. Most of the experimental studies of paraquat poisoning have focused on its effects on peripheral tissues e.g. lung, liver, kidney. Recently, paraquat has been shown to be a strong and selective reversible inhibitor of acetylcholinesterase activities in human erythrocytes and electric eel (1,2). Furthermore, it has been reported that both systemic and intrahippocampal injections of paraquat produced behavioral excitation accompanied 24 hr. later by brain damage and antagonist studies suggested involvement of muscarinic and N-methy1-D-aspartate (NMDA) receptors in the neurotoxic mechanism.

REFERENCES:

(1) Shinohara T. and Seto Y. (1986) Agric. Biol. chem. 50, 255.

(2) Seto Y. and Shinohara T. (1988) Arch. Toxicol. 62, 37.

(3) Bagetta et al. (1992) Pharmacol. & Toxicol 71, 443.

ARSENIC FROM GOLD

The prevalence of arsenic in gold mining regions of Ghana, notably in Obuosi and Prestea, is due to contamination that occurs during the roasting process for extraction of gold from arsenic and sulfur-containing ores.

Mining makes up a very large portion of the gross national product of Ghana and is playing a significant role in the economic recovery programme of the country. Gold mining accounts for the largest proportion of foreign exchange earned by Ghana. However, studies have established large amounts of aresenic in soils, water, plants, some food items, and human hair in Obuosi samples. While the soil studies show the arsenic in the soils to be largely labile, the waters investigated contain too much arsenic to be useful even for the preservation of aquatic life or agricultural purposes and are definitely unfit for drinking.

(Source: Environmental Health Perspectives, Vol. 101, No. 1 April 22, 1993).

"Environmentally sound development is our (ADB) operational principle and central to our Medium-Term Strategic Framework, ... environmental protection is our agenda for the 1990s and beyond".

Kazi F. Jalal
Chief, Office of the Environment
Asian Development Bank

In his address to the United Nations Conference on Environment and Development in Rio de Janeiro in 1992, President Kimimasa Tarumizu of the Asian Development Bank thus reaffirmed the Bank's commitment to the improvement of the quality of life of the people of the Asia-Pacific region.

In order to examine how the ADB incorporates considerations of environmental impact into its policy-making decisions in programs and projects development, CRI/ICEIT Editorial Board members interviewed the Chief of the Office of the Environment Asian Development Bank, Kazi F. Jalal, and put the following questions to him:

Q: ***Why is the Asian Development Bank interested in the environment?***

A: It has been observed that the pattern of recent development in developing member countries (DMCs) has resulted in considerable adverse effects on the environment, including pollution, deforestation and land degradation. The Bank recognizes the importance of protecting the environment from the pressure of development and population growth, and the need for action to remedy past degradation of the environment and depletion of natural resources. This is basically in line with the Bank's fundamental and long-term mission to improve the living conditions and the quality of life of the people in the Asia-Pacific region. To fulfill this mission, the Asian Development Bank integrates environmental concerns with the overall objectives of socio-economic development. The United Nations Conference on Environment and Development (UNCED) held in Rio Janeiro in 1992 confirmed this mission and the Bank reaffirmed its commitment to this mission as manifested by the statement of President Tarumizu in an address to the Conference. The President of the Asian Development Bank stated that *"Environmentally sound development is our (ADB) operational principle and central to our Medium-Term Strategic framework,..... environmental protection is our agenda for the 1990s and beyond"*. It is in this perspective that the Bank has and will continue to incorporate, where relevant, considerations of environmental impact into lending, technical assistance and policy activities, and provide support for specific projects and for strengthening DMC (developing member country) institutions concerned with the environment.

Q: ***What is the function of the Office of the Environment and how is it organized?***

A: The Office of the Environment (OENV) of the Asian Development Bank has to date, eleven professional staff with various specializations in the field of environment. The OENV is headed by myself who had a chance to work in Thailand for over 15 years (1976-1992) for the United Nations. Dr. Bindu Lohani, who has himself worked extensively in Thailand, is the Assistant Chief.

View of the ADB Headquarters in Manila, Philippines.

The OENV plays an important role in undertaking all aspects of environment and natural resources related to Bank operations. By contributing to policy-making decisions, programs and projects development, and serving as a Bank resource center, the Office has facilitated the integration of environmental planning at all levels of Bank activities. Specifically, the in-house functions of OENV include providing technical advice on environmental matters, training of Bank staff on the environmental aspects of Bank operations, generating environmental guidelines, environmental review and monitoring, performing impact assessment, establishing and maintaining an environmental database, and ensuring that the Bank's investment projects are environmentally sound.

The OENV is also the Bank's instrument that provides assistance to DMCs particularly in the preparation of environmental and natural resources sector work, strengthening DMC institutions involved in the planning and management of environmental resources, and in building environmental awareness in DMC governments through technical assistance grants.

The OENV has also been tasked to carry out the Bank's mandate of regional and international cooperation in the field of environment. It has worked closely with the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), the United Nations Development Programme (UNDP), the United Nations Environment Programme (UNEP), and with the various sub-regional environmental programmes such as the ASEAN Environmental Programme (ASEP), the South Asian Cooperative Environmental Programme (SACEP), and the South Pacific Regional Environmental Programme (SPREP), to ensure that there is a common voice among governments and various institutions of the region on environmental priorities.

The OENV also serves as the Bank's focal point in its collaboration with other international organizations and specialized agencies particularly for post-UNCED implementation i.e., for Agenda 21 and the Climate Change and Biodiversity Conventions, and with the implementing agencies of the Global Environment Facility (GEF).

Q: ***How is the Office of the Environment involved in policy formulation at the Bank?***

A: The OENV initiates policy formulation insofar as the Bank's environmental programmes are concerned. In relation to this, the OENV, then an Environmental Division in 1985, spearheaded the formulation of the Bank's approach to incorporating environmental issues into Bank operations and was instrumental in the formulation of the Bank's environmental policy framework, and has since then continuously provided inputs to the Bank's over-all policy making activities, particularly those policies with environmental implications.

Q: ***How does the Office of the Environment interact and cooperate with the investment division?***

A: Interaction of the OENV with the Projects Department is reflected in Figure 1 which generally illustrates how environmental considerations are integrated into the Bank's project cycle.

Based on information on proposed projects by the Projects Department, the OENV prepares a report called *Preliminary and Secondary Environmental Review of Loan and Technical Assistance Projects* which contains, for each project, a summary of major environmental concerns, the environmental category, the anticipated need for an IEE or EIA, and the scope of EIA work.

After further consultation with project staff, the OENV forwards a summary report called *In-House Liaison and Participation of Environment Specialists in Loan and Technical Assistance Projects* to the Projects Department and to Management. The OENV uses this report to establish a more detailed work program, focusing on the environmental aspect of project processing. The environmental specialists are normally consulted in the

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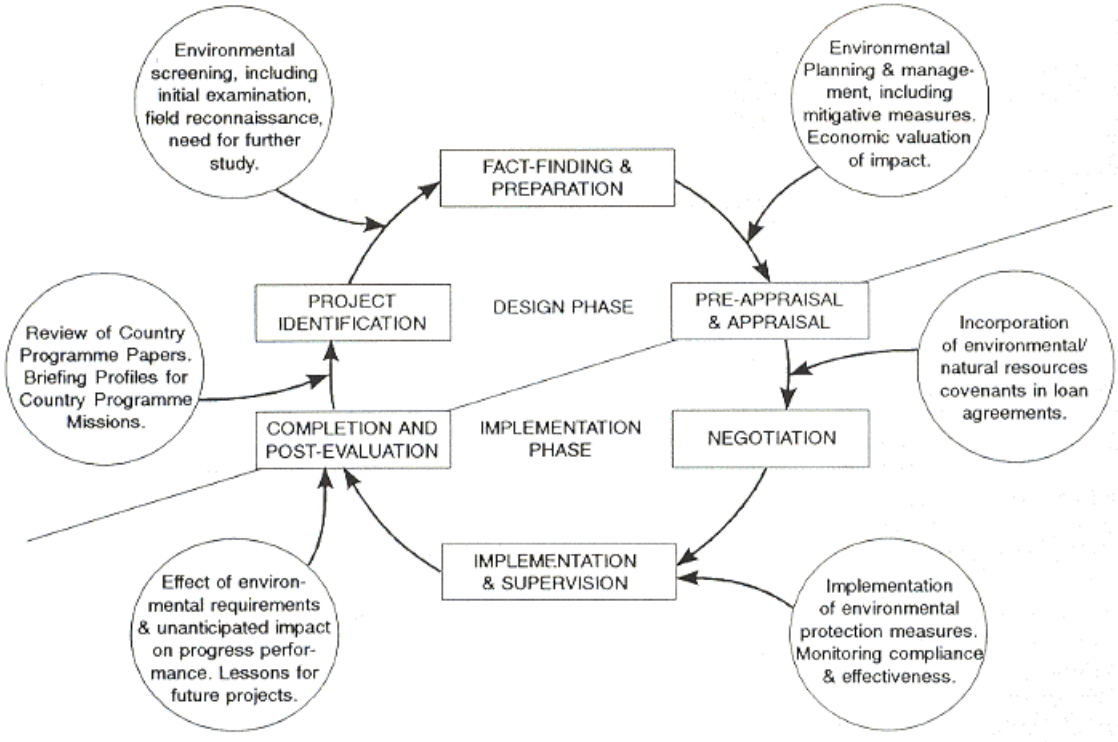
Figure 1

Integration of Environmental Considerations in the Project Cycle



development of the terms of reference for IEE (initial environmental examination) or EIA (environmental impact assessment) work and become members of the project team to ensure that environmental aspects of projects proposed for Bank financing are adequately addressed.

Towards year-end, the OENV prepares a report called *Loan Projects Approved During 19___: Projects Requiring Environmental Review During Implementation* which lists all projects requiring specific environmental treatment during the implementation phase. The review Mission is dispatched periodically to verify that environmental safeguards built into the project design are satisfactorily implemented by the borrower or executing agency during the construction and operation of the project.

Also towards year-end, the OENV prepares a report called *Post-Project Appraisal: Projects Requiring Environmental Analysis* which attempts to review and assess the beneficial and detrimental environmental impacts of the project, the location and design or operational alternatives considered and reasons for the final choice, environmental protection measures adopted and the effect of such measures on project costs and on the economic evaluation of the project, and the environmental aspects of the project in relation to overall cost-benefit analysis. An environment specialist may assist in the post-evaluation mission where adverse environmental effects have been identified. This, in a capsule is how the OENV assists projects departments in developing environmentally sound projects.

The OENV also offers other services to projects departments by way of conducting annual training programmes at the Bank, introducing staff to the principles and practices of environment and natural resources planning and management to improve their skills in environment-related operations.

Q: ***What are the relationships and/or cooperative programmes with other United Nations agencies?***

A: At the regional level, the Bank is working closely with the UN/ESCAP, the UNEP and the UNDP in the implementation of regional environmental activities. One such

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activity is the recently concluded *Second Asia-Pacific Seminar on Climate Change* held in Bangkok on March 29-31, 1993, a component of the Bank's on-going regional technical assistance on global environmental issues (RETA 5463: Global Environmental Issues). The seminar was organized by ESCAP in close collaboration with the Bank and co-sponsored by the Environment Agency of Japan.

Another Bank-funded activity being presently organized by ESCAP is the *Regional Meeting on Financing Mechanisms for Environmental Programmes and Projects* to be held on June 15-17, 1993 in Bangkok. The meeting will discuss the technical papers prepared by consultants engaged by the Bank under a regional technical assistance on financing mechanisms (RETA 5491: Regional Study of Financing Mechanisms for DMCs Environmental Programmes and Projects).

The UNDP has requested the Bank to execute a technical assistance project on the *Development of Least-Cost Greenhouse Gas Emissions Reduction Plans*. The Bank has agreed in principle to implement the project and negotiations are underway for its implementation in November 1993. The UNDP has also solicited the Bank's cooperation in capacity building exercise for promoting sustainable development in the region, which is under active consideration.

The above-mentioned activities are over and above regular consultations/dialogues with specilized UN agencies such as UNEP, the World Health Organization (WHO), the Food and Agriculture Organization (FAO), the International Fund for Agricultural Development (IFAD) on regional environmental matters of mutual interest.

Also, the Bank's participation in UNCED has put further emphasis on its collaboration with other international organizations and specialized agencies. The Bank continues to liaise with the secretariats for post-UNCED implementation (Agenda 21, the Climate Change Convention, and the Biodiversity Convention). It also liaises with the UN Commission on Sustainable Development, under the auspices of the Economic and Social Council (ECOSOC), which monitors UNCED implementation by national governments and other development organizations participating in intergovernmental negotiations.

Q: ***What are the environment priority areas of the Bank?***

A: The Bank's Medium-Term Strategic Framework for 1993-1996 places great emphasis on the environment. Accordingly, fifty per cent of Bank projects should meet the social and/or environment objective. This is intended to make a significant annual allotment for environment-related lending. The Bank will pursue and support the following priority areas for environmental protection:

- pollution control in the industry and power sectors;
- energy conservation and end-use efficiency;
- marine, water, land and soil resources management and conservation;
- environmental improvement in both rural and urban areas;
- interlinked poverty reduction and environmental improvement; and
- tropical forest management and conservation of biological diversity.

As a corollary to this, the OENV has identified potential priority areas for environmental lending in DMCs. For Indonesia, Malaysia, Thailand, and the Philippines for instance, the Bank will continue environmental lending for forestry, urban development, and marine and coastal resources management but will at the same time encourage lending in the industrial pollution control and water resources management sectors. And while energy and environment and forestry development remain the priority areas in the People's Republic of China, concerns for worsening urban conditions and aggravating industrial pollution require that environmental lending be opened up to these sectors. But the biggest challenge for the Bank is to sustain a gradual increase in the volume of environmental lending.

Q: ***What, in your opinion, are the most important environmental challenges facing countries in the Asia and the Pacific region?***

A: Deforestation, resulting in watershed degradation and loss of biological diversity, is seen as the most critical environmental issue in the region. According to available information, the rate of deforestation in the region is close to 5 million hectares per year, which is double the rate calculated in the eighties. This severe reduction in forest cover, much of it old growth, is considered the single-most serious ecological problem in Malaysia, Thailand, Indonesia, the Philippines, the People's Republic of China, and India.

Along with deforestation, the twin blight of urban congestion and pollution are the principal environmental problems shared by the largest number of DMCs. Parts of the Asia-Pacific also suffer from water resource problems, industrial pollution, land and soil resource problems, marine and coastal resource degradation, waste disposal problems, and acid rain.

What convergence of factors contributed to such a scenario? Identified causes include biogeographic determinants, population pressure and poverty, weak institutions and low human resource capability, lack of funds, foreign debt, overreliance on exports of primary resources, protectionism, and the lack of political will and commitment.

The Bank as the primary development and financial institution in the region is cognizant of these stumbling blocks to improving the environmental conditions of the region – and most importantly, to the sustainable development of its DMCs, and has appropriately assigned high priority to environmental protection and natural resources management, alongside the important agenda of economic growth, poverty alleviation, and women in development.

"MODERN TECHNIQUES IN BIOTECHNOLOGY: RECOMBINANT DNA TECHNOLOGY I"

This training course, organized by Chulabhorn Research Institute, is one of the activities in the project entitled "Human Resources Development in Environmental Toxicology and Biotechnology to Promote Sustainable Development" supported by UNDP.

The course will be held from 4-13 October 1993, at Chulabhorn Research Institute, Laksi, Bangkok and will comprise a workshop divided into two parts: theoretical lectures and hands on practical sessions.

The Theoretical Lectures
(3 days, 4-6 October;
with a maximum of 65 participants)

The topics of the lectures are:

1. Bacterial Genetics and Plasmid Biology.
2. Regulation of Gene Expression in Prokaryotes and Eukaryotes.
3. Recombinant DNA Enzymology.
4. Molecular Cloning of Prokaryotes and Eukaryotes.
5. Screening and Characterization of Cloned Genes.
6. Special Techniques for Recombinant DNA of Eukaryotes and Plants.
7. PCR Techniques.

The Hands on Practical Sessions
(7 days, 7-13 October;
with a maximum of 20 participants)

Topics to be covered are:

1. Isolation of DNA and RNA from Bacteria and Plant.
2. Isolation of Plasmid DNA.
3. Restriction Enzymes Analysis of Genomic and Plasmid DNA.
4. Gene Transfer and Molecular Cloning.
5. Screening and Characterization of Cloned Gene, Non-radioactive Screening, Southern Blot, Northern Blot, Western Blot.
6. PCR Techniques.

LECTURERS

1. *Dr. N.P. Ambulos,*
   University of Maryland at Baltimore, USA
2. *Dr. C. Sax,*
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The completed registration form should reach the secretariat by 15 September 1993.

The ICEIT NEWSLETTER is published quarterly by the International Centre for Environmental and Industrial Toxicology of the Chulabhorn Research Institute, supported in part by the Asian Development Bank. It is intended to be a source of information to create awareness of the problems caused by chemicals. However, the contents and views expressed in this newsletter do not necessarily represent the policies of ICEIT.

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