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**INTERNATIONAL COURSE ON
ENVIRONMENTAL BIOTECHNOLOGY**

February 17-28, 1992
Cuernavaca, Morelos
MEXICO

FINAL REPORT

Instituto de Biotecnología
Universidad Nacional Autónoma
de México (UNAM)

Course Coordinator:
Gloria Soberón-Chavez, Ph.D.
Rodolfo Quintero-Ramírez, Ph.D.

April 1, 1992
Cuernavaca, Morelos, MEXICO

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TECHNICAL REPORT

The ICGEB Course on "Environmental Biotechnology" was held in Cuernavaca, February 17-28, 1992. For that purpose the Instituto de Biotecnología, Universidad Nacional Autónoma de México (IBT/UNAM) and UNIDO signed a contract (No. 92/044/CW) for the execution of the mentioned course.

The course's organizers were Dr. Gloria Soberón-Chávez and Dr. Rodolfo Quintero both from the IBT/UNAM with the advise of Dr. Ananda M. Chakrabarty (University of Illinois). Most of the activities (lectures and laboratory work) were carried out in the installations of IBT/UNAM located in Cuernavaca, Morelos.

The financial support for the course came from different sources with a total cost of 54,000 US dollars:

* ICGEB/UNIDO	30,000
* IBT/UNAM	10,000
* Academic institutions from Latin America (air tickets)	10,000
* Academic institutions of Mexico (travel expenses)	4,000

	54,000

This report refers to the academic activities of the course as well as their evaluation. In the annexes the most relevant information is presented in detailed form. The original documents that back up this report are deposited in the IBT/UNAM.

Course Program

The course covered a wide range of topics all related to Environmental Biotechnology; during two weeks the students attended 36 hours of theoretical lectures, 32 hours of laboratory

work, 4 hours visiting waste-water treatment plants and 3 hours of discussion in a round table on Environmental Microbiology in Mexico. The details of the program are in Annex I.

Academic staff

The lectures of the course were given by invited professors from abroad and Mexico, and by the researchers of the IBT/UNAM:

* Invited Professors (Spain, Norway, USA, Austria)	7
* Invited Professors from mexican universities	2
* IBT/UNAM researchers	9

In the Annex II the name and address of each of them is given.

Participating students

We received 55 applications to the course coming from:

* Argentina	1
* Austria	1
* Bolivia	1
* Colombia	5
* Costa Rica	1
* Chile	1
* Ecuador	1
* India	3
* Mexico	34
* Tunisia	2
* Venezuela	3

The students from Argentina, Chile and Ecuador were accepted but did not attend the course because they were unable to find complementary support. The applications coming from countries outside the region (Austria, India, Tunisia) were not accepted.

The origin of the participating students were:

* Bolivia	1
* Colombia	5
* Costa Rica	1
* Mexico	25
* Venezuela	3

The mexican students came from the following academic institutions:

* IBT/UNAM	7
* UNAM	2
* UAM	4
* UANL	2
* UACH	1
* UGto	1
* ITSon	1
* ITVer	1
* ITCel	1

also from research centers associated with mexican companies:

* IMP	3
* CIATEJ	1
* LANFI	1

The academic level of the participants and their background varied as follows:

* Ph.D.	8
* M. Sc.	12
* B. Sc.	15

their origin was:

* Companies	9
* Universities	26

Experimental work

Once we received the curricula of the participants, it was clear that very few had knowledge or training in molecular biology.

In most cases they were interested in the field of Environmental Biotechnology as a new area of research and work. For these reasons we had to change our initial plans concerning the experimental work of the course.

We decided that it was better to present many laboratory techniques, one every afternoon, give plenty of written material to the students and time for discussion with researchers who had plenty of experience on the specific methods. Eight laboratory sessions were held with a duration of 32 hours.

Evaluation

At the end of the course evaluation were given to each students in order to evaluate the course and receive suggestions and comments (Annex IV). We received 27 answers out of 35, the main results are:

- the course was rated 86/100
- the load of topics covered 90/100
- laboratory work 69/100
- interaction with researchers and lecturers 82/100
- most of the students agreed that all topics were important and interesting
- the relationship between theory and experimental work 85/100
- the efficacy of laboratory work as teaching tool 65/100
- quality of lectures 95/100
- quality of notes and handout material 85/100
- several lectures were mentioned as outstanding:
 - Dr. Ramos 24/ 27
 - Dr. Kamely 21/ 27
 - Dr. Cervantes 20/ 27
 - Dr. Chakrabarty 19/ 27
 - Dr. Finnerty 14/ 27
- all students recommended to repeat the course, covering the same topics at the same level

- most critics were on the design of the experimental work, but recognizing that in a group of such differences in background, laboratory demonstrations are suitable.

Documents

All lecturers and students received a diploma of attending the course (Annex V).

The original documents of the filled evaluations forms are in our files. The receipts and copies of documents covering the expenses of the course are in the Administrative Section of the IBT/UNAM.

FINANCIAL REPORT

FINANCIAL REPORT

C C N C E P T	A M O U N T (PESOS)
A. Financial support for students	35'700,000.00
B. Financial support for course's professors	34'594,455.00
C. Course expenses	20'290,000.00
T O T A L	90'574,455.00

ICGEB/UNIDO Support:

First payment 24,000 USD
(3,018.8 pesos x 1 UDS)

\$ 72'451,200.00

Second payment 6,000 USD
(still pending)

\$ 18'112,800.00

\$ 90'564,000.00

A. FINANCIAL SUPPORT FOR STUDENTES

- Living expenses

N A M E	COUNTRY	AMOUNT (PESOS)
Edgar Gómez Aguirre	Colombia	2'100,000.00
Carmen Medialdea	Venezuela	2'100,000.00
Marianela Arias de Flores	Venezuela	2'100,000.00
Manuel Loza Murguía	Bolivia	2'100,000.00
Fabio Augusto Roldán García	Colombia	2'100,000.00
Sandra Baena Garzón	Colombia	2'100,000.00
Hernán Camacho Soto	Costa Rica	2'100,000.00
José Durán	Venezuela	2'100,000.00
Oscar Alberto Cámara Durán	Son., México	900,000.00
Joel Espinoza de los Monteros	Guad., México	900,000.00
Maricela Aguado Gutiérrez	Mich., México	900,000.00
José Luis Ihave	Chih., México	900,000.00
Hugo Alberto Luna Olvera	Mty., México	900,000.00
José Antonio Rocha	Gto., México	900,000.00
Roberto Zazueta Sandoval	Gto., México	900,000.00
Juan José Gutiérrez	Mty, México	900,000.00
Gloria Florez Calderón	Colombia	2'100,000.00
Carlos Ramón Barrera López	Colombia	2'100,000.00
T O T A L		28'200,000.00

During two weeks breakfast and lunch was offered for students and professors attending the course:

* breakfast	3'300,000.00
* lunch	4'200,000.00

	7'500,000.00

T O T A L **\$ 35'700,000.00**

B. FINANCIAL SUPPORT FOR COURSE'S PROFESSORS

- Air tickets

N A M E	COUNTRY	AMOUNT (PESOS)
Dr. Carlos Cervantes Vega	Michoacán, Mex	120,000.00
Dr. William Finnerty	E.U.A.	1'974,088.00
Dr. Irwing C. Gunsalus	E.U.A.	3'055,950.00
Dr. Juan Luis Ramos	Granada, España	4'268,584.00
Dr. Svein Valla	Noruega	3'139,552.00
Dr. Ananda Chakrabarty	E.U.A.	1'225,633.00
Dra. Daphne Kamely	E.U.A.	1'439,968.00
Dr. George Tzotzos	Viena	3'320,680.00
T O T A L		18'544,455.00

- Living expenses (375,000 pesos/day)

N A M E	COUNTRY	AMOUNT (PESOS)
Dr. Carlos Cervantes Vega	Mich., México	1'125,000.00
Dr. William Finnerty	E.U.A.	1'125,000.00
Dr. Irwin C. Gunsalus	E.U.A.	1'500,000.00
Dr. Svein Valla	Noruega	1'500,000.00
Dr. Juan Luis Ramos	Granda, España	1'500,000.00
Dr. Ananda Chakrabarty	E.U.A.	1'500,000.00
Dra. Daphne Kamely	E.U.A.	1'500,000.00
T O T A L		9'750,000.00

- Professor's compensation

Each professor received 90,000 pesos/hour of lecture, this was only for local personnel:

* 70 hours 6'300,000.00

T O T A L **\$ 34'594,455.00**

C. COURSE EXPENSES

C O N C E P T	A M O U N T (P E S O S)
Reagents and lab material	8'200,000.00
Course notes and handout material	6'780,000.00
Transportation (Cuernavaca-Mexico) and to industrial site visits	3'300,000.00
Administrative and secretarial support	2'000,000.00
T O T A L	20'280,000.00

ANNEX I

**DETAILED COURSE
PROGRAM**

INTERNATIONAL COURSE ON ENVIRONMENTAL BIOTECHNOLOGY

**INSTITUTO DE BIOTECNOLOGIA, UNAM
CUERNAVACA, MORELOS, MEXICO
February 17-28, 1992**

Organizers: Gloria Soberón-Chávez, Rodolfo Quintero and Ananda M. Chakrabarty

COURSE PROGRAM

Monday 17:

- 9:00 - 11:00 Prof. I. C. Gunsalus
Historic panorama of the research in biodegradation
- 11:30 - 13:30 Dr. C. Cervantes
Biochemistry and genetics of bacterial resistance to heavy metals
- 15:00 - 19:00 Experimental work: Megaplasmid visualization
Dr. G. Soberón-Chávez

Tuesday 18:

- 9:00 - 11:00 Prof. I. C. Gunsalus
Biochemistry and molecular biology of biodegradation Part I.
- 11:30 - 13:30 Prof. I. C. Gunsalus
Biochemistry and molecular biology of biodegradation Part II.
- 15:00 - 19:00 Experimental work: DNA cloning
Dr. G. Soberón-Chávez

Wednesday 19:

- 9:00 - 11:00 Dr. W. Finnerty
Biochemistry of surfactants
- 11:30 - 13:30 Dr. C. Cervantes
Perspectives of the use of bacteria resistant to heavy metals in bioremediation
- 15:00 - 19:00 Experimental work: Polymerase chain reaction (PCR)
Dr. X. Soberón

Thursday 20:

- 9:00 - 10:00 Dra. G. Soberón-Chávez
Methods used to evaluate gene transfer in natural environments
- 10:00 - 11:15 Dr. R. Quintero
New problems and perspectives in risk assessment
- 11:30 - 13:30 Dr. W. Finnerty
Uses of surfactants in bioremediation
- 15:00 - 19:00 Experimental work: Site directed mutagenesis
Dr. X. Soberón

Friday 21:

- 9:00 - 10:00 Visit to Waste-water treatment plant
- 10:30 - 11:30 Visit to Instituto Mexicano de la Tecnología del Agua (IMTA)
- 12:00 - Environmental Microbiology in Mexico
Round Table with the participation of researchers from Mexican Petroleum Institute, Chemistry Faculty/UNAM, Universidad Autónoma Metropolitana (UAM), Biological Sciences of the Instituto Politecnico Nacional (IPN)

Monday 24:

- 9:00 - 11:00 Dr. S. Valla
Uses of exopolisaccharides in bioremediation
- 11:30 - 13:30 Dr. J. L. Ramos
Molecular genetics of TOL plasmids
- 15:00 - 19:00 Experimental work: DNA-sequencing
Dr. M. Zurita

Tuesday 25:

- 9:00 - 11:00 Dr. S. Valla
Alginate: biochemistry, molecular genetics and applications
- 11:30 - 13:30 Dr. J. L. Ramos
Genetic manipulation of bacteria to select strains with better catabolic abilities
- 15:00 - 19:00 Experimental work: Protein isolation, purification and characterization (I)
M. Sc. L. Guereca

Wednesday 26:

- 9:00 - 11:00 Prof. A. M. Chakrabarty
Short term evolution of bacteria with novel catabolic potentials
- 11:30 - 13:30 Dr. J. L. Ramos
Problems of the environmental release of genetically engineered microorganisms and genetic strategies to avoid them
- 15:00 - 19:00 Experimental work: Chemostat studies
Dr. T. Ramirez

Thursday 27:

- 9:00 - 10:00 Prof. A. M. Chakrabarty
Screening, characterization of bacteria producing surfactants
- 10:15 - 11:15 Dr. D. Kamely
Perspectives on risk assesment and government policy in environmental regulation
- 11:30 - 13:30 Prof. A. M. Chakrabarty
Future trends in bioremediation
- 15:00 - 19:00 Experimental work: Protein isolation, purification and characterization (II)
M. Sc. L. Guereca

Friday 28:

- 9:00 - 11:45 Dr. G. Tzotzos
Risk assessment methodologies for the release of genetically modified organisms to the environment
- 12:00 - 13:00 Dr. D. Kamely
Novel biotechnological approaches to environmental pollution
- 13:00 - 13:30 Dr. F. Bolivar
Concluding remarks
Entrega de diplomas

ANNEX II

LIST OF INVITED PROFESSORS

LIST OF INVITED PROFESSORS

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LIST OF PARTICIPANTS

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ANNEX IV

EVALUATION FORM

CURSO INTERNACIONAL SOBRE BIOTECNOLOGIA AMBIENTAL
Febrero 17-28, 1992

EVALUACION

1. SOBRE EL CURSO:

Evalúe el curso en la escala del 0 al 100

100 _____ 75 _____ 50 _____ 25 _____ 0 _____

Cuáles características le impactaron más (evalúe del 0 al 100)

- _____ a. La cantidad de temas tratados
- _____ b. Las prácticas de laboratorio
- _____ c. La interacción con los profesores

Cite algunos otros (si lo considera conveniente)

- d. _____
- e. _____
- f. _____

Por favor liste en orden de prioridad las principales deficiencias que usted detectó en el curso:

- a. _____
- b. _____
- c. _____

Cuáles fueron los logros más importantes que usted alcanzó durante el curso:

Piensa usted que algunos temas específicos de gran interés no se trataron en el programa:

SI _____

NO _____

Si su respuesta es afirmativa, indique cuáles:

a. _____

b. _____

c. _____

2. SOBRE LA METODOLOGIA DE ENSEÑANZA

Evalúe la efectividad de las prácticas como elemento de consolidación de la parte teórica:

100 _____ 75 _____ 50 _____ 25 _____ 0 _____

Sugiera algunas mejoras:

Evalúe el balance entre teoría y práctica:

100 _____ 75 _____ 50 _____ 25 _____ 0 _____

Evalúe la calidad de las conferencias (de 0 a 100) _____

Evalúe la calidad de las notas:

Deficiente _____ Aceptable _____ Muy bueno _____

Evalúe la calidad del material audiovisual:

Deficiente _____ Aceptable _____ Muy bueno _____

Evalúe el número de conferencias:

Adecuado _____

Demasiadas _____

Recomiende para cursos futuros un número de conferencias aceptable (estime 2 horas por conferencia):

3. SOBRE LOS EXPOSITORES

Indique las conferencias que más le agradaron:

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Señale el nombre de los expositores con los cuales usted volvería a tomar otro curso:

_____	_____
_____	_____
_____	_____
_____	_____

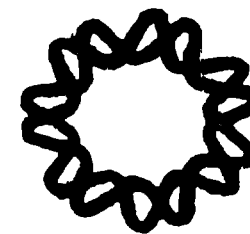
4. ASPECTOS GENERALES

	SI	NO
Recomendaría este curso:	_____	_____
Demasiado trabajo:	_____	_____
Usaré las notas frecuentemente en mi lugar de trabajo:	_____	_____
Aprendí muchos nuevos conceptos	_____	_____
Le gustaría que se repitiera el curso:	_____	_____

5. SUGERENCIAS PARA MEJORAR EL CURSO Y SU ORGANIZACION

ANNEX V

**CERTIFICATE OF ASSISTANCE
AND PARTICIPATION TO
THE COURSE
(Professors and students)**



El Centro Internacional de Ingeniería Genética y
Biotecnología, ONUDI y el Instituto de Biotecnología de la
Universidad Nacional Autónoma de México
Otorgan el Presente

RECONOCIMIENTO

A:

Por su asistencia al "Curso Internacional de Biotecnología
Ambiental" llevado a cabo en la ciudad de Cuernavaca,
Mor., del 17 al 28 de Febrero de 1992

Dr. George Tzotzos
ICGEB UNIDO

Dr. Francisco Bolívar Zapata
IBT UNAM