

# **RECENT ADVANCES IN PHARMACOLOGY AND THERAPEUTICS**

# RECENT ADVANCES IN PHARMACOLOGY AND THERAPEUTICS

Proceedings of the XII Latin-American Congress of  
Pharmacology and the III Inter-American Congress of  
Clinical Pharmacology and Therapeutics,  
Caracas, 2-7 October 1988

*Editors:*

**Manuel Velasco**

Department of Pharmacology, Vargas Medical School  
Central University of Venezuela, Caracas

**Anita Israel**

Department of Biology, Pharmacy School  
Central University of Venezuela, Caracas

**Eduardo Romero**

Department of Pharmacology, Vargas Medical School  
Central University of Venezuela, Caracas

**Honorio Silva**

Department of Pharmacology, Razetti Medical School  
Central University of Venezuela, Caracas

*Associate Editors*

Fuad Lechín

Margarita Salazar-Bookaman

Luisa H. Valdivieso

Augusto Campos

Luis Fuenmayor

Yarisma Barbella

Margarita Lamanna

Gladys Martin



1989

**EXCERPTA MEDICA, Amsterdam – New York – Oxford**

© 1989 Elsevier Science Publishers B.V. (Biomedical Division)

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise without the prior written permission of the publisher, Elsevier Science Publishers B.V., Biomedical Division, P.O. Box 1527, 1000 BM Amsterdam, The Netherlands.

No responsibility is assumed by the Publisher for any injury and/or damage to persons or property as a matter of products liability, negligence or otherwise, or from any use or operation of any methods, products, instructions or ideas contained in the material herein. Because of rapid advances in the medical sciences, the Publisher recommends that independent verification of diagnoses and drug dosages should be made.

Special regulations for readers in the USA - This publication has been registered with the Copyright Clearance Center Inc. (CCC), 27 Congress Street, Salem, MA 01970, USA. Information can be obtained from the CCC about conditions under which photocopies of parts of this publication may be made in the USA. All other copyright questions, including photocopying outside the USA, should be referred to the copyright owner, Elsevier Science Publishers B.V., unless otherwise specified.

International Congress Series No. 839  
ISBN 0 444 81107 9

*This book is printed on acid-free paper.*

*Published by:*

Elsevier Science Publishers B.V.  
(Biomedical Division)  
P.O. Box 211  
1000 AE Amsterdam  
The Netherlands

*Sole distributors for the USA and Canada:*

Elsevier Science Publishing Company Inc.  
655 Avenue of the Americas  
New York, NY 10010  
USA

*Library of Congress Cataloging in Publication Data:*

Latin-American Congress of Pharmacology (12th : 1988 : Caracas, Venezuela)

Recent advances in pharmacology and therapeutics : proceedings of the XII Latin-American Congress of Pharmacology and the III Inter-American Congress of Clinical Pharmacology and Therapeutics, Caracas, 2-7 October 1988 / editors, Manuel Velasco ... [et al.] ; associate editors, Fuad Lechin ... [et al.]

p. cm. -- (International congress series ; no. 839)

ISBN 0-444-81107-9 (U.S. : alk. paper)

1. Pharmacology--Congresses. 2. Chemotherapy--Congresses.  
I. Velasco, Manuel. II. Inter-American Congress of Clinical  
Pharmacology and Therapeutics (3rd : 1988 : Caracas, Venezuela)  
III. Title. IV. Series.

[DNLM: 1. Drug Therapy--congresses. 2. Pharmacology--congresses.

W3 EX89 no.839 / QV 4 L357 1988r]

RM300.L33 1988

615.5'8--dc20

DNLM/DLC

for Library of Congress

89-12068  
CIP

Printed in The Netherlands

## **PREFACE**

This volume comprises the invited papers presented at the XII Latin-American Congress of Pharmacology and the III Inter-American Congress of Clinical Pharmacology and Therapeutics held in October 1988, in Caracas, Venezuela. The contributors were selected from among the most outstanding investigators in the field of pharmacology and clinical pharmacology and therapeutics from different parts of the world. The majority of the papers reflect both original research and current state-of-the-art reviews. The volume has been divided in several chapters which cover the most recent advances in pharmacology, and clinical pharmacology and therapeutics. The editors are indebted to all the people and institutions that made this international event possible. Finally we are also grateful to Elsevier Science Publishers for publishing these proceedings.

MANUEL VELASCO, M.D.  
Professor of Pharmacology

ANITA ISRAEL, Pharm. D.  
Professor of Pharmacology

EDUARDO ROMERO, M.D. Ph.D.  
Professor of Pharmacology

HONORIO SILVA, M.D.  
Instructor of Pharmacology

Central University of Venezuela, Caracas, Venezuela

## CONTENTS

Opening remarks	
<i>M. Velasco</i>	1
Opening remarks	
<i>L.D. Fuenmayor</i>	3

## PLENARY LECTURES

A Bayesian approach for evaluating severe adverse events associated with new drugs: Guillain-Barre syndrome and zimelidine	
<i>C.A. Naranjo, K.L. Laxtrot, M. Ho-Asjoe and D. Lane</i>	9
Cellular and molecular mechanisms in hormone and neurotransmitter secretion	
<i>J.-M. Trifaró, M.L. Novas, S. Fournier and A. Rodriguez del Castillo</i>	15
Silent myocardial ischemia: Diagnosis and treatment	
<i>H.C. Mehmehl</i>	21
Classical and atypical neuroleptic drugs: Similarities and dissimilarities	
<i>B.A. Ellenbroek and A.R. Cools</i>	25
Allogenic receptors in the carotid vascular bed: Bradykinin-serotonin interaction	
<i>A.P. Corrado and G. Ballejo</i>	37
Experimental attempts to reverse degeneration of central cholinergic neurons	
<i>A.C. Cuello, L. Garofalo, R.L. Kenigsberg and D. Maysinger</i>	43
Neurochemical, hormonal and immunological views of stress: Clinical and therapeutic implications in Crohn's disease and cancer	
<i>F. Lechin, B. van der Dijks, S. Lechin Báez, G. Vitelli, M. Lechin and A. Cabrera</i>	57
A comparison of prostaglandin-dependent, indomethacin-sensitive regulatory mechanisms between patients with American cutaneous leishmaniasis and American trypanosomiasis	
<i>M. Castes, A. Panagiotopoulos, D. Trujillo, D. Scott and W. Mosca</i>	71
Calcium antagonists: Actions in the central nervous system	
<i>J. Florez, M.M. Dierssen and M.A. Hurlé</i>	77

## RECENT ADVANCES IN GASTROENTEROLOGY: PHARMACOLOGY AND THERAPEUTICS

New options for treatment with H-2 receptor blockers	
<i>J.R. Poleo</i>	85
Inhibition of energy metabolism by bile salts in the gastric mucosa	
<i>J. Chacin and D. Nuñez</i>	95

## RENAL PHARMACOLOGY

Pathogenesis of aminoglycoside nephrotoxicity	
<i>C.A. Vaamonde</i>	103
Pathogenesis, medical treatment and prevention of calcium oxalate renal stones	
<i>J.R. Weisinger, E. Bellorin-Font, N. Pernaleté and V. Paz-Martínez</i>	107
Pharmacological modulation of ATPase activity on kidney tubules	
<i>M. Pérez-González</i>	111
Nephrotoxicity and renal microcirculation	
<i>M.A. Boim and N. Schor</i>	115
Effect of atrial natriuretic peptide and angiotension II on the kinetics of proximal tubule acidification	
<i>G. Nascimento Gomes and M. de Mello Aires</i>	121
Pharmacologic and non-pharmacologic regulation of sodium-phosphate cotransport in the kidney	
<i>E. Bellorin-Font, C.L. Milanes, R. Starosta, N. Pernaleté, J.R. Weisinger and V. Paz-Martínez</i>	125
The tubuloglomerular feedback mechanism: Effect of furosemide on the macula densa cells	
<i>E. González, A.E.P. Persson and M. Salomonsson</i>	129

## TOXICOLOGY OF REPRODUCTION

Epidemiology and statistics in reproductive toxicology	
<i>J.M. Avila-Rovira</i>	137
Mechanisms of action of reproductive toxicants	
<i>D.R. Mattison, D.R. Plowchalk and M.J. Meadows</i>	141
In vitro human placental perfusion: A method for assessing placental toxicity	
<i>R. Pérez-D'Gregorio, R.K. Miller, P.J. Wier and Y. Shah</i>	147
Female reproductive toxicology	
<i>D.R. Mattison, D.R. Plowchalk and M.J. Meadows</i>	151

## POSTMARKETING SURVEILLANCE

Perspectives of post-marketing surveillance in Latin America	
<i>H. Silva</i>	161
Assessing causality of adverse events in postmarketing surveillance: Bayesian evaluation of a case	
<i>C.A. Naranjo, K.L. Lanctot, M. Ho-Asjoe and D. Lane</i>	165
Implications of drug utilization studies for drug surveillance	
<i>U.E. Busto</i>	169

## ISCHEMIC HEART DISEASE

### Nitrates and ischaemic heart disease

*E. Goetz, B. Knoll, A. Urbina, O. Hernandez-Pieretti and M. Velasco* 175

### Mononitrates in ischemic heart disease

*H.C. Mehmel* 189

## THERAPEUTIC MANAGEMENT OF ACQUIRED IMMUNODEFICIENCY SYNDROMES (AIDS)

### Gene regulatory cascade in T-cells and the HTLV-I tax gene product

*R. Patarca, R.P. Singh and H.I. Cantor* 195

### Serodiagnosis of HIV-1 infections using recombinant-derived antigens

*D.J. Marciani, R.M. Thorn, C.H. Riggan, G.A. Beltz and  
C.-H. Hung* 199

## NEUROPEPTIDES

### Functional role of brain atrial natriuretic factor: Possible systems mediating its action

*A. Israel, M. Torres and Y. Barbella* 205

### Effect of corticoids on brain angiotensin II receptors

*E. Castrén and J.M. Saavedra* 211

### Metabolism of thyrotropin releasing hormone

*P. Joseph-Bravo, F.-L. Charli and L. Covarrubias* 215

## PHARMACOLOGY OF SLEEP

### Role of acetylcholine and of biogenic amines in the control of REM sleep

*J.M. Monti* 223

### Benzodiazepine-adenosine interaction in the CNS and sleep in rats

*M. Hawkins, N.M. Porter and M. Radulovacki* 227

### Benzodiazepines and sleep induction: A possible role of potential-dependent calcium flux in neurons

*J.V. Martin and W.B. Mendelson* 231

## ANTIBIOTICS

### Toxicity of cephalosporins and aminoglycosides

*S.B. Greenberg* 245

## DRUG ABUSE

### Behavioral context of drug abuse

*P.B. Dews* 251



## ANTIARRHYTHMIC DRUGS 'GORDON K. MOE'

Electrophysiologic effects of quinidine in canine purkinje fibers and ventricular myocardium. Slow development of antiarrhythmic and arrhythmogenic effects of the drug

*C. Antzelevitch, J.M. Davidenko, S. Sicouri, L. Cohen, A. Iodice,  
R. Goodrow and G.A. Gintant*

259

Arrhythmogenesis by group I anti-arrhythmic drugs

*V. Lamanna*

265

## USE OF CONVERTING ENZYMES INHIBITORS IN HYPERTENSION AND CONGESTIVE HEART FAILURE

Regulation of arterial pressure: Renin-angiotensin system

*R. Cardona and F. Fragachan*

271

Effects of food on the pharmacokinetics and ACE-inhibition of perindopril in healthy volunteers

*C. Funck-Brentano, B. Lecocq, P. Jaillon and M. Devissaguet*

277

Clinical pharmacology of perindopril

*K.R. Lees and J.L. Reid*

281

Efficacy and acceptability of perindopril in the treatment of essential hypertension

*J.P. Degaute, M. Leeman, J.P. Santoni and J.R. Thomas*

285

Efficacy and acceptability of perindopril in the treatment of chronic congestive heart failure

*G. Bottineau, Ph. Lechat, C. Castaings, J.Ph. Santoni and  
J.P. Bounhoure*

289

## PSYCHOPHARMACOLOGY

Cognitive and motor disorders in animals and man: Manifestations of a progressive pathology of neostriatal and mesostriatal structures

*A.R. Cools, R. Jaspers, R. v.d. Bos, W. Spooren, M. Horstink,*

*K. van Spaendonck and H. Berger*

295

Rate and duration of stimulation: As a determinant of drug action on the CNS

*L.X. Cubeddu*

307

Determinants of drug abuse

*U.E. Busto and E.M. Sellers*

315

Differential effects of serotonin uptake inhibitors on addictive behaviour in humans

*C.A. Naranjo*

319



## PHARMACOKINETICS

- Ethnopharmacokinetics: A novel approach to the study of population pharmacology. The case of Amerindian populations  
*T.D. Arias* 325
- Relationship between the plasma concentrations of a drug and its pharmacological effect  
*P. du Souich, A. Lecrivain and R. Babini* 329
- Pharmacokinetics of angiotensin converting enzyme inhibitors  
*Z.H. Israili* 335

## CARDIOVASCULAR THERAPY

- Intravenous thrombolytic therapy of acute myocardial infarction  
*G.H. Hendrix and J.F. Spann Jr* 343
- Hypertension and atherosclerosis: Clinical and therapeutic implications  
*H. Silva and I. Soltero* 351
- Calcium antagonists in cardiovascular disease  
*E. Romero Vecchione* 355
- Efficacy and safety switch study from prazosin to doxazosin in the treatment of mild to moderate essential arterial hypertension  
*J. Guevara, I. Soltero, M. Velasco, A. Urbina, O. Hernández and H. Silva* 367

## NEW ASPECTS IN THE PHARMACOLOGICAL THERAPY OF ASTHMA

- Theophylline and derivatives in asthma  
*L.A. Abel de la Cruz* 383
- Anti-allergic agents  
*M.J. Armas de Hernandez* 387
- How is the contraction of the smooth muscles of the airways achieved?  
*A. Ponte-Sucre* 391
- A study of bronchial hyperactivity, a model for pharmacology  
*R. Sanchez de Leon* 395

## IMMUNOPHARMACOLOGY

- Effect of iron compounds on the immune response in vitro  
*A. Soyano, H. Pons, R. Montañó, E. Romano, A. Muller-Soyano and R. Somoza* 401
- Immune response in schistosomiasis mansoni. Its role in resistance, pathology, prophylaxis and chemotherapy  
*O. Noya G.* 405

## RECEPTORS

Quantitative autoradiography of psychotomimetic receptors in brain	411
<i>J.M. Saavedra</i>	
Melatonin receptors in brain and retina	417
<i>M.L. Dubocovich and J.-M. Fang</i>	
Platelet and brain $\alpha_2$ -adrenoreceptors in endogenous depression	421
<i>J.A. Garcia-Sevilla</i>	
Closing remarks	425
<i>A. Stern-Israel</i>	
Closing remarks	427
<i>H. Silva</i>	
Index of authors	429

## OPENING REMARKS

DR. MANUEL VELASCO

President, Organising Committee

It is an honour for me and a source of pride to preside over the XIIth Latin American Congress of Pharmacology and Therapeutics, the IIIrd Inter-American Congress of Clinical Pharmacology and the 2-day Venezuelan Congress on Pharmacology, which are to take place in our city between the 2nd and 7th of October, 1988. This Congress is made up of distinguished scientists from Latin America, the United States and Canada, with the aim of reviewing the most recent advances in experimental and clinical pharmacology and in medical therapeutics.

For Venezuelan doctors this Congress is particularly important because they have the opportunity to bring up to date their knowledge of this important speciality of medical science. This Congress pays homage to the founders of pharmacology in our country: Drs. Marcel Granier and Siegbert Holz, who devoted their entire lives to the service of pharmacology in its various aspects: teaching, research and public health. It is to these two persons that our Congress pays the greatest tribute, bearing witness to their activity as leading citizens.

This Congress also pays homage to the internationally known leading pharmacologist Dr. Ulrich Trendelenburg, on the occasion of the celebration of the XXVth anniversary of the Postgraduate School of Pharmacology in the Faculty of Pharmacy of the Central University of Venezuela, at present coordinated by Dr. Margarita Salazar. On Wednesday, October 5th at 12 noon, we shall hear Dr. Trendelenburg's Magistral Lecture. At this same moment we may also remember Dr. Antonio Muskus who lent brilliance to Venezuelan pharmacology at an international level and did important service to our national pharmacology.

The scientific programme of the Congress includes: (1) 29 symposia; (2) 26 magistral lectures; (3) 140 individual papers; (4) 10 updating courses and (5) 3 satellite symposia.

In practice almost all areas of pharmacology and therapeutics have been covered in this Congress. For medical students and house physicians this Congress is without a doubt the best opportunity to renew and bring up to date their pharmacological and therapeutic knowledge. The scientific programme was arranged by the Scientific Committee: Dr. Fuad Lechin, Dr. Augusto Campos, Dr. Eduardo Romero and Dr. Yarisma Barbella.

About 140 individual papers will be read, in various fields: cardiovascular, antibiotics, pharmacokinetics, respiratory, receptors, anti-neoplastic drugs, atherogenesis etc. from almost all Latin American countries, showing that basic and clinical pharmacological research is being carried out despite the

economic problems in our countries. The Venezuelan Archives of Pharmacology and Therapeutics are publishing the individual papers in a Special Supplement, and I wish to express my gratitude to the Editorial Board of this important Venezuelan journal for this collaboration.

I also express my gratitude to the following public and private institutions: the Ministry of Health and Social Assistance, the Ministry of Transport and Communications, the Autonomous Institute of Maiquetia Airport, the National Council for Scientific and Technological Research, the Council for Scientific and Humanistic Development of the Central University of Venezuela, the Rector's Office of the Central University of Venezuela, the Franco-Venezuelan Association for the Medical Sciences, the IME Fund, the Polar Foundation, the Latin Bank, the World Health Organisation, and the Pan-American Public Health Office. I also express my gratitude to the Venezuelan and International Pharmaceutical Industry, which gave the greatest economic collaboration and scientific sponsorship, which were decisive for the organisation of this event. The list of laboratories which cooperated with this Congress is very long: Servier, Merck Sharp & Dohme, Leti, Pfizer, Roche, Sandoz, Bristol, Pharma, Protón, Bayer, Winthrop, Química Schering, Elmor.

My thanks to Elsevier Science Publishers, Amsterdam for publishing the Records of this Congress, and to Dr. Alfonso Matallana for his constant encouragement and collaboration. I have left until the end the names of the people who assisted me in the difficult task of organising a Scientific Congress of this magnitude: Dr. Anita Israel, Dr. Honorio Silva, Dr. Margarita de Lamanna, Dr. Luisa Elena Valdivieso, on whom almost all the weight of the Congress fell, Dr. Fuad Lechin, Dr. Yarisma Barbella, Dr. Augusto Campos, Dr. Gladys Martin, Dr. Rafael Campo, Dr. Eduardo Romero, Dr. Gianni Pinardi, and Dr. Margarita Salazar. Special thanks to Ms. Elsa D'Empaire, Director of GAELCA, who organised the meeting and experienced with us all the vicissitudes involved in organising this Congress. Finally, in the name of the Organising Committee, I extend a cordial welcome to foreign and Venezuelan guests, to foreign and Venezuelan delegates, to the assistants at the Congress, to honorary Presidents, to special guests and the illustrious personalities of the Praesidium: Dr. Francisco Montbrum, Minister of Health and Social Assistance, Dr. Luis Fuenmayor, Rector of the Central University of Venezuela and Vice-President of this Congress, Dr. Norberto Terragno, IUPHAR Delegate, Dr. Alfonso Matallana, President of the Latin-American Association of Pharmacology, and Dr. Fuad Lechin, President of the IME Fund. My dearest wish is that this Congress will live in the minds of all Latin-American colleagues as the effort of the Venezuelans to organise a Congress which actively represents our scientific level of pharmacology and our cultural heritage.

Many thanks to all.

## OPENING REMARKS

LUIS D. FUENMAYOR, M.D., Ph.D.

Rector of the Central University of Venezuela, Caracas, Venezuela

To be present at an event of this nature, in which investigators from different countries meet to exchange knowledge and experience, cannot but generate a series of expectations in the scientific community in which it takes place, since it enables us to become acquainted, directly and through its protagonists, with the development of scientific activity in different parts of the world. In addition, it makes it possible to compare some developments with other developments; to know the difficulties which others are experiencing, and compare them with ours; to see that the problems experienced by different countries which are our brothers or our friends are almost certainly very similar among nations with the same level of economic and social development, whose economies are subject to the decisions of transnational monopolies.

This week in Caracas scientific investigators from Latin-American countries are meeting, visited by investigators from other latitudes, with the aim of exchanging experiences, questions and knowledge in one particular area of science. However, the discussions which arise must transcend the narrow limits of the particular concrete scientific activity carried out by each one of us, so that we may discuss and reflect upon the future of scientific investigation in our countries, the difficulties encountered by this activity, the causes of such difficulties, and the deterioration experienced to a greater or lesser degree in recent years. This reflection is important, since otherwise we shall not in the future have opportunities like this to meet to exchange experiences, as there will be no experiences of investigation to exchange. We are running a real risk of seeing our laboratories closed in the course of the next few years, without a single tear showing in the eyes of our governing bodies. Science appears to have no mourners within the groups that are leading our nations.

In Venezuela, to quote our own case, the complete amount of the national budget devoted to scientific investigation has been steadily diminishing since 1981. Today we are devoting to scientific investigation much less than 1% of the gross territorial product of the country, a percentage recommended by UNESCO as the lowest desirable for a developing country. This is still more serious if we take into account the fact that half the sum we devote to scientific investigation is taken by one single institution: INTEVEP. In 1985, to mention a recent year, the National Council of Scientific and Technological Investigations (CONICIT) stopped financing 50% of the experimental projects received and favourably recommended in 1984; its scholarship holders were reduced from 223 in 1983 and 166 in 1984 to only 117; it suspended the financing of study voyages and scientific meetings and suspended international cooperation agreements (Urbina, 1985). In addition, part of the budget for science awarded to CONICIT is spent on bureaucratic costs which do not help scientific activity properly speaking.

As if this were not enough, from 1983 onwards the massive devaluation of our country's coinage was added to the financial deficit, a situation which is not yet stabilised. In 1984 the grant of preferential dollars for the acquisition of scientific equipment was abolished; in 1986 the budget for expenses in the scientific sector reached the lowest level of the last 15 years, only 0.055% of the national budget; in the same year the programme of postgraduate scholarships was abolished, by which the country loses the possibility of renewing its scientific cadres (Di Prisco, 1986).

At university level, which in our country is basic to scientific production, the economic crisis has the consequence that the budget assigned to the national universities has been greatly reduced since 1982. This shortage of resources,

together with a mistaken policy on the part of those who were running the university in the last 7 years, meant that the crisis was dealt with, and economies were made, by reducing the sums assigned to scientific investigation, libraries, maintenance of equipment and laboratories. This caused a very great reduction in the capacity of the universities to generate knowledge, and appeared to condemn them to be simply transmitters of knowledge generated in other countries. Thus the libraries of the Central University of Venezuela, the first university of the country, saw their collections of books and periodicals reduced, as they had no possibility of acquiring any. Many of our libraries could not take out any subscriptions to periodicals in the years 1984 and 1985, and for the present year the endowment of our libraries is only 50% of that of 1982 (Pérez-Rancel, 1987).

The crisis has been so serious that it has affected institutions such as the Venezuelan Institute of Scientific Investigation, which in 1987 had been 15 years without resources for the acquisition of new equipment; it saw its body of investigators reduced from 138 in 1983 to only 86 in 1987, of whom 21 were on leave and would possibly not come back; its "Marcel Roche" library, in the past one of the best in Latin America, stopped receiving 42,000 issues of periodicals between 1983 and 1987 (Viso, 1987).

To consider these questions, not only for academic purposes but to direct the action of the investigators of our countries, must be one of the basic aims of this Scientific Congress and of many similar events taking place in the future in any of our underdeveloped and dependent countries. In these nations the scientific communities are the only ones really interested in maintaining an adequate academic level as far as scientific investigation is concerned. For this reason we call them to lead the fight to compel our governments to give the attention and support that scientific and technological investigation requires in order to rise above underdevelopment. This reality has begun in recent years to be understood in Venezuela. Thus investigators in our universities and other institutions have begun to struggle for better economic and work conditions, and for greater resources for scientific activity. These struggles have included strikes, the publication of leaflets denouncing the situation and setting out their demands, meetings and demonstrations in the streets of Caracas and other towns in the nation.

With this action our scientific community shows clearly that we do not mean to stand idly by while this deterioration continues. The importance of efforts to achieve true developments in this country must be clearly seen. It must be understood that it is impossible to speak of national independence and sovereignty, if the chasm separating us from the developed countries is continually becoming wider and deeper with regard to science and technology.

We must understand that scientific and technological investigation are not priorities with our government, nor with the dominant economic groups. We must convince the rest of our people of the need to reach higher levels of knowledge in order to have a better standard of living.

Creation, whether artistic or intellectual, is one of the human activities which give most satisfaction to whoever achieves them. The feeling of a painter finishing a work of art is practically the same as that of a workman making a product for the satisfaction of material needs. The musician finishing a score, a poet finishing a poem and a housewife finishing a dainty dish all experience that pleasant sensation which strengthens them inwardly and makes them repeat it over and over without the tedium which attends other human activities. The investigator, whether in natural or social science, has the same attitude to the work of discovering truth, which he carries out day by day, hour by hour, second by second of his life, with indefatigable passion and dedication. This same dedication, this same persistence must be brought to the defence of this activity, which is the purpose and the meaning of our life as investigators. If we do not do it now, we are condemning ourselves to disappear, and condemning Venezuela

to plunge ever deeper into the black hole of underdevelopment, for man does not experiment only for personal satisfaction, but also to rise above nature and put it at his service. This means that knowledge is a right of human society, and gives it the power to produce the material goods which it must have to satisfy its infinite needs.

In our countries the struggle for greater possibilities of development for science and technology is indissolubly linked with the fight for a more just distribution of wealth. We, the investigators, cannot ignore the fact that as long as a large proportion of our resources is destined to pay the external debt, we shall not be able to get more money for scientific research. As long as in Venezuela almost 40% of the national budget is used to pay the debt and its interest, there will be no money for science, not to guarantee health, education, food and the satisfaction of our compatriots' other needs. The struggle against paying the external debt, which has already been paid several times over with the millions of dollars which have gone out of our countries in payment of interest, is part of the struggle which all our people must wage, including the investigators, to achieve better conditions of life and work. Otherwise our laboratories will fade away, we shall not have the books we need to learn at least about what is happening in more fortunate countries; we shall not have skilled auxiliary staff and we shall not be able to renew our body of investigators. Scientific and technological investigation will simply disappear.

In our countries, to seek solidarity among investigators and institutions of developed countries should be a task of the first order. To achieve collaboration with other nations, to join forces in this colossal task should be another aim for which to strive. To obtain facilities for the publication of our results should be part of the agreements; today publication in reputable journals is difficult because of its cost. An effort to strengthen our publications would be entirely supported by the Scientific Community of our countries. To reach agreements for collaboration in the field of staff training would be a very important strategic consequence. In short, everything this meeting may achieve towards improving the conditions for scientific research will be well received and will have immense value for the Latin American nations.

I cannot end this greeting without referring to the personal satisfaction it gives me to be here today as Rector of the Central University of Venezuela. For the benefit of those who do not know, I am a pharmacologist by profession, and have worked for very many years with several of the organisers of this important meeting. I have worked with the President of the Congress, Dr. Manuel Velasco, since we entered the Department of Pharmacology of the José María Vargas Medical School in 1968, when we began our career as lecturers and researchers in pharmacology. I can say the same of Dr. Eduardo Romero, another of the organisers of this Congress. At the same time, as a pharmacologist I must express my pleasure at seeing here together so many scientists highly qualified in so many different branches of pharmacology. I am particularly glad to count among them our master Dr. Augusto Campos, an all-round scientist who directed our first steps in this discipline and is still guiding old and new generations of researchers by his work and his example.

My dearest wish is that this meeting will bear fruit. May its fruits be gathered far beyond our geographical frontiers and the frontiers of our particular interests. I hope that at the end of the Congress we shall have the conviction of having done much for the development of pharmacology, but also for the defence of research in general and its right to help the Latin Americans to live decently in their various countries. Let us support the Unity of South and South, as the only way to face our problems successfully.



## REFERENCES

1. MARIA C. DI PRISCO. "El financiamiento de la Investigación Científica en Venezuela no responde a un Plan Nacional bien estructurado". Gaceta apucv/ipp, - Año 7, N° 45, pp 13-14, marzo-abril 1986
2. MARIA PEREZ RANCEL. "Suprimida adquisición de revistas científicas en bibliotecas y hemerotecas de la UCV". Gaceta apucv/ipp, Año 8, N° 55, pp 6-7, octubre-diciembre 1987.
3. JULIO URBINA. "El colapso de la inversión en Investigación - Científica y Tecnológica en Venezuela: Una decisión política". Boletín AsoVAC, N° 2, septiembre-octubre 1985.
4. CARLOS CISO. "Necesitamos de la Ciencia y la Tecnología". Gaceta apucv/ipp, Año 8, N° 55, pp 1-2, octubre-diciembre 1987.

## PLENARY LECTURES