

Pan American Health Organization

ADVISORY COMMITTEE ON MEDICAL RESEARCH

Sixth Meeting

Washington, D.C., 12-16 June 1967

Item 4.4 of the Agenda

PLAN FOR THE DEVELOPMENT OF MULTINATIONAL  
LATIN AMERICAN CENTERS FOR RESEARCH AND TRAINING  
IN PATHOLOGY

Ref: RES 6/1.2

25 May 1967

PAN AMERICAN HEALTH ORGANIZATION  
Pan American Sanitary Bureau, Regional Office of the  
WORLD HEALTH ORGANIZATION

Washington, D.C.

PLAN FOR THE DEVELOPMENT OF MULTINATIONAL LATIN AMERICAN CENTERS  
FOR RESEARCH AND TRAINING IN PATHOLOGY\*

1. Introduction

The experience of workers in the health sciences in Latin America shows that there is a great need for specialists in pathology in practically all of the Latin American countries. This need is felt at all levels of medical practice and is aggravated by the very heavy migration of pathologists from Latin American countries to the United States. The need for pathologists has been felt in several areas, as evidenced by the following paragraphs.

1.1 Health Statistics

The Inter-American Investigation of Mortality, carried out by PAHO with the collaboration of governments and medical institutions of Latin America, recognized and made evident the need to improve the pathology services in Latin America in order to better evaluate the health problems of these countries. The study, which is the only good evidence on causes of death in many places, could only be carried out in those cities which have acceptable pathology departments. The information gained in this study represents only a few urban areas of Latin America and it cannot be extrapolated to other areas without considerable risks. The reliability of the data of this study is directly proportionate to the quality and quantity of the

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\*Prepared for the Sixth Meeting of the PAHO Advisory Committee on Medical Research, 12-16 June 1967, by Dr. Pelayo Correa, Department of Pathology, Universidad del Valle, Cali, Colombia, acting as PAHO consultant.

pathology departments existing in the cities studied. Any further evaluation of the health situation of those countries depends greatly on the improvement of pathology departments. One of the main handicaps of the child mortality study, which is being planned at the moment, is precisely the lack of adequate data on pathology for those areas. Further morbidity and mortality surveys in Latin America, which need to be carried out, are not possible at the moment because of the need of pathology services.

#### 1.2 Medical care

The actual care of patients in most Latin American non-profit hospitals is of a rather low standard. This standard is especially low in those hospitals which lack an adequate pathology department. The need for pathology departments expresses itself in two main areas. In the first place, there is the obvious need for a surgical pathology section which confirms most of the diagnosis on surgical diseases. In the second place, the development of clinical pathology as a branch of medicine is very rudimentary in Latin America. Laboratory procedures are in very little use in many Latin American hospitals and outpatient clinics, partly because the clinical pathology laboratories, with some exceptions, are split or separated into rudimentary departments of chemistry, parasitology, microbiology and hematology. The training of physicians in Latin America, with exceptions, usually does not include any laboratory clerkship and therefore most of the physicians are not in a position to make good use of a clinical pathology department. The consequences of

this lack in the standard medical care are clear.

### 1.3 Medical education

In many areas of Latin America the teaching of pathology to the medical students follows the old European lines of pathologic morphology and takes little cognizance of the dynamic aspects of disease. This has a rather marked effect on the attitude towards disease by doctors who later in practice do not have a searching attitude and rely on description rather than on investigation. This situation is being changed in some medical schools and it has proven that this change brings about other changes in practically all other disciplines in the medical curriculum.

### 1.4 Research

Research is probably the most underdeveloped field of the medical sciences in Latin America and this is also true in pathology. Very few centers are doing research in recent years. The development of this aspect of pathology is especially important for a long range planning because it is felt that most of the development of tomorrow will be connected to the research done now. Research is needed in several directions, mainly to estimate the quantity, quality, and epidemiology of the diseases that are affecting the human communities in Latin America, and also basic research into the mechanisms of disease. Several attempts at establishing research centers in the past have failed because of the lack of university affiliation. Research within universities is new and an encouraging sign in a few centers.

### 1.5 Administration of Justice

Even if it may seem to be out of place at first glance, it is obvious that the administration of justice in Latin America is among, other things, a health problem. Forensic pathology is probably the most rudimentary branch of medicine in Latin America. The ignorance and poor practice of forensic medicine masks many real causes of death and in this way is one of the most important factors that influence the collection of vital statistics. It also hides epidemics of diseases which are misdiagnosed in the forensic services. The inadequate practice of forensic pathology is one of the major handicaps of epidemiological studies on accidents, which should serve as the basis for preventive measures.

### 1.6 Present situation

The number of pathology departments in Latin America has been increasing lately and representatives of all levels of quality can be found. There is an important study on this prepared for PAHO by Dr. H. Torloni, which describes "in extenso" the situation of 27 departments of pathology in Latin America as of 1964.

One important pathology organization in Latin America is the SLAP (Sociedad Latinoamericana de Patología). This society has been in existence for 10 years and is representative of the development of pathology in Latin America. It has approximately 200 members and has held 5 meetings that have been attended by an increasing number of pathologists. These meetings were held every three years at the beginning and every two years lately. The sixth meeting of the

society will be held in San Juan, Puerto Rico, in the second week of December 1967.

The SIAP is practically the only connection that exists among Latin American pathologists. It edits a mimeographed circular letter which is periodically distributed to the members and contains news in pathology in Latin America. The society started the publication of a journal (Revista Latinoamericana de Anatomía Patológica), but after some time this journal had to be stopped because of lack of funds. There is, however, enough scientific production for a Latin American journal on pathology. The journal was edited mainly with funds of the Venezuelan government in the first years and when this help was lacking the journal had to stop circulation.

At the present time there are several departments of pathology that offer training in this specialty in Latin America. Most of these programs, up to now, are adequate for general practice but not for advanced training. People with a high capacity who, if convinced to remain in their country, will probably be the leaders of the future, usually have to go abroad for further training. The training programs in the departments of pathology are usually on a national basis and cover only residents of those countries where they operate. Most of them, however, cannot meet the general needs of the country.

PAHO has sponsored a collaborative program among three departments of pathology in Colombia, those of Cali, Bogotá and Medellín, aimed at the training of pathologists for other countries. This program takes advantage of the existing organizations and is designed to complement the training in the different departments

according to the needs of the candidates. The program is, again, adequate for practicing pathologists, but is not especially designed for training in research. In Cali, there is an International Center for Medical Research and Training (ICMRT), sponsored by the U.S. National Institutes of Health/USPHS. This organization is mainly for research and at the present time does not take trainees from other Latin American countries. However, it is possible that future modifications of the program could take into account the possibilities of combining the training of researchers in pathology with those of the ICMRT.

It is obvious that the preceding needs and problems in pathology in Latin America cannot be attacked simultaneously. For this reason, priorities should be established. It is felt that the most important area that should be improved first is research, because all other future developments depend on it, because it will bring scientific atmosphere to universities, and because it is more in need of stimulation. Training of practicing pathologists, although insufficient and not ideal, is already being carried out by several laboratories; training of high academic quality for the leaders of pathology of the future is almost totally lacking. After a sufficient number of centers devoted to research and advanced training in modern pathology have been developed, attention should be given to clinical pathology and forensic pathology.

## 2. Proposal for Multinational Latin American Centers for Research and Training in Pathology

It is proposed that a program be established to correct

the defects of the existing situation by creating opportunities for advanced training and research in pathology in Latin America. It is estimated that there are at the present time sufficient bases to start this type of program on a limited scale and that it will find enthusiastic support from and bring great benefits to several institutions of higher education in Latin America.

### 2.1 Objectives

The ultimate objective of this proposal is to moderate the present trend of migration of pathologists from Latin America by developing both the atmosphere and the conditions necessary for creative scientific work. Such goal may be attained by concentrating on the following immediate objectives:

- 2.1.1 To help develop research teams which will act as multipliers by training new researchers,
- 2.1.2 To promote research in pathology in Latin America,
- 2.1.3 To influence the teaching of medicine in Latin America through the development of research activities in the University,
- 2.1.4 To establish and/or improve ways and means of communicating results of pathology research to the medical community in Latin America, and
- 2.1.5 The laboratories involved in this project would serve as center for investigators from other areas wishing to study local problems or advance their knowledge in specific fields.

### 3. Organizational Framework

It is proposed that a Latin American Committee on Pathology (LACOP) be nominated. The Committee will work in close collaboration with PAHO in attaining stated objectives (see Section 2.1 above).



The Committee should be representative, within pathology, of the geographic regions of Latin America and its membership rotated according to a defined system. The functions of the Committee will be as follows:

3.1 Advise PAHO on the specifics of complementing the human and material resources of the departments of pathology which are at the present time in the capacity to give advanced training in this discipline. The Committee will recommend for inclusion in this PAHO-sponsored program a number of departments on the basis of their previous accomplishments in the field and of their present research potentialities. A program of complementation of each department will be developed by PAHO after appropriate study and consultation with the Committee. Some of the departments that are being considered initially are the following:

- 3.1.1 Department of Pathology of the Autonomous University of Mexico, directed by Dr. Ruy Pérez Tamayo, especially competent in immunopathology and cytogenetics.
- 3.1.2 Department of Pathology of the Universidad del Valle in Cali, Colombia, especially competent in geographic pathology, experimental pathology and immunofluorescence.
- 3.1.3 Department of Pathology of the Cayetano Heredia University in Lima, Peru, directed by Dr. Javier Arias-Stella, especially competent in ecologic pathology, particularly high altitude pathology
- 3.1.4 Instituto Venezolano de Investigaciones Científicas, in Caracas, Venezuela, competent in experimental pathology of infectious diseases. Dr. Luis Carbonell is the head of its Department of Experimental Pathology.

The staff of the above mentioned departments has maintained a continuous flow of scientific publications in the international journals in the last years.

The Committee will study and evaluate other departments of pathology and recommend to PAHO their inclusion in the program. It is considered that the departments of pathology participating in this work should be limited in number, at least during the first 5 or 10 years.

### 3.2 Planning of Training of Candidates

The Committee will advise PAHO on matters pertaining to curricula, selection of candidates, placement for post-graduate training and to finding adequate positions for the trainees upon completion of training. It will also participate in the supervision of the candidates' training.

It is proposed that the first year of training will be in the regular pathology departments of the different countries or in the program that has been established in Colombia. During the first year the capabilities of the candidates will be evaluated by the department head and those candidates that are outstanding will be eligible for the program in advanced pathology. In view of the uniqueness of the program, candidates should be eligible whether or not their place of origin coincides with their place of training.

3.3 The Committee will collaborate with PAHO in developing and establishing a communications network among Latin American pathologists.

It is considered that this will be best accomplished by the publication of a journal in pathology. There is experience that is very valuable in this field and it is felt that if the journal is supported for some time and its circulation augmented it can become economically independent in a few years.

3.4 The Committee will assist in programming and carrying out training courses to complement fields in pathology where action is needed to improve the knowledge of Latin American pathologists in some of the weak points and to serve as a communication scheme for the advance and dissemination of new knowledge.

3.5 It is recommended that the program be developed in two steps: A) During the first year candidates will be evaluated who are at the present time in the first year of training in the different departments; and simultaneously the further staffing and equipping of the departments will be carried out; B) preparing a special program for each candidate for advanced training in pathology. Candidates will be chosen from those already in training and the program will be tailored individually for each candidate and based on his capabilities, his ambitions, and the opportunities in his home country. It is also considered that once the candidate finishes his training, he be required to submit a research proposal to PAHO and if this is sound in the opinion of the Committee, a small grant would be given for supporting his research in his home institution.

3.6 It is recommended that the Committee be constituted on the basis of competence - with geographic representation being a

secondary consideration - and appointed by PAHO. The Committee should have an Executive Secretary.

3.7 It is recommended that once this Committee is nominated, a meeting be arranged as soon as possible. If not earlier, a good opportunity will be the 6th Latin American Congress on Pathology to be held in the second week of December 1967, in San Juan, Puerto Rico. Committee members will visit departments of pathology to evaluate and recruit potential candidates for this program from among those who have been in departments of pathology for at least one year.

#### 4. Program

The program for each trainee will vary according to his own preparation and interests. Some general ideas, however, may be indicated as follows:

- 4.1 Special training and research can be offered in the following fields: immunopathology, cytogenetics, geographic pathology of cancer and infectious diseases, ecologic pathology, and experimental pathology.
- 4.2 All candidates must have a first year of training in an approved department of pathology, equivalent to the first year of residency.
- 4.3 After this first year, the candidate will choose the special field in which he wishes to continue special training. It should be understood that such special training is to be conducted in addition to the formal residency training in pathology, although some minor variations will be inevitable due to local factors.

4.4 Special training will require two basic activities: a) courses in various sciences, to be taken in the university or wherever they are available, and b) a research project. Both activities will be under the direct supervision of a senior investigator assigned to each candidate.

4.5 Some of the basic courses for each of the five major fields would be as in Table 1. Other courses may be introduced according to special needs, such as histochemistry or parasitology, and the duration and depth of each course will depend on the individual needs of the candidate.

Table 1

## BASIC COURSES FOR SPECIAL TRAINING PROGRAMS

Courses	Immuno-pathology	Cyto-genetics	Geographic Pathology	Ecologic Pathology	Experimental Pathology
Biochemistry	x	x			x
Biophysics	x				x
Biology	x	x	x	x	x
Statistical analysis	x	x	x	x	x
Epidemiology			x	x	x
Cytology		x			
Physiology				x	
Microbiology	x		x	x	x
Electron microscopy	x	x	x	x	x

4.6 The original research project must be completed and presented as a thesis. Ideally, an examination should be given and some kind of academic recognition obtained, possibly in the form of a degree conferred by the respective university. This point obviously requires further study and agreement by the various universities. Definite plans for careers leading to degrees (Master and Ph.D.) in experimental pathology are being made in three universities involved in this proposal.

Table 2

BUDGET FOR MULTINATIONAL CENTERS IN PATHOLOGY: 4 DEPARTMENTS

Items	1968	1969	1970
Staff salaries, professors technicians	\$ 100,000.00 8,000.00	\$ 100,000.00 16,000.00	\$ 100,000.00 24,000.00
Equipment	80,000.00	40,000.00	40,000.00
Research funds	60,000.00	70,000.00	80,000.00
Travel	5,000.00	7,000.00	10,000.00
Fellowships	25,000.00	50,000.00	65,000.00
Publications	8,000.00	8,000.00	8,000.00
Consultants	12,000.00	12,000.00	12,000.00
Courses	10,000.00	15,000.00	15,000.00
Administration of the program	37,000.00	35,000.00	40,000.00
Grants for returning fellows			30,000.00
Other	<u>40,000.00</u>	<u>40,000.00</u>	<u>40,000.00</u>
Total	\$ 385,000.00	\$ 393,000.00	\$ 464,000.00

## 5. Budget

The four departments of pathology selected thus far for the multinational program in pathology have fully trained staff. Their basic facilities are summarized in the Annex to this document. Budget requirements for the first 3 years of the program are outlined in Table 2.\* The figures are all approximate estimates based on preliminary calculations of the possible needs in every item. They refer to 4 departments of pathology working with a maximum of 3 research fellows each. Extension of the program will require revision of the budget. Explanatory notes to several aspects of this budget follow:

5.1 Staff salaries.- Funds are required to offer adequate positions to investigators originally trained in the 4 departments and presently away, waiting to return to their countries of origin. Failure to provide salaries and research facilities to this group of highly trained investigators would result in their remaining abroad. Salaries are estimated in the budget for two full-time members for each of the 4 departments, at the monthly rate of \$ 800.00 for each investigator. It is also estimated that each research fellow would need one qualified technician to assist him in his work; since there will be a yearly increase of 1 fellow in each department for three years, and each technician was estimated at a monthly salary of \$ 150.00 each, the figures shown correspond to 4 technicians in the first year, 8 technicians in the second year, and 12 technicians in the third year.

- 5.2 Equipment. - This depends on the previously existing equipment in each department and on the needs of each research program. It should be mentioned, however, that this is probably the area in which more help is needed since equipment is usually obtained abroad and must be paid in dollars, which are often quite difficult to raise. Obviously, most of the deficiencies would be met in the first year, and the remaining years would require less funds, to be distributed in maintenance and repair as well as in acquisition of new equipment specifically directed to particular projects.
- 5.3 Research funds. - To be used as research grants, they cover animals, maintenance, chemicals and glass materials, etc. A lump sum should be made available to each research fellow by PAHO, after it studies and approves the research project. Funds should also be available to support the research activities of the newly recruited staff investigators. The figures in the budget are based on \$5,000.00 for each of the two new staff members and \$5,000.00 for each research fellow.
- 5.4 Travel. - The program cannot be initiated and conducted without facilities for meetings and travel of the Committee. This refers only to the administrative functions of the program; all other travel connected with special courses, attendance of scientific meetings, etc., are included either in research funds or in fellowships or other items.



5.5 Fellowships. - This program is aimed at preparing future leaders in the field, and therefore is not massive. The 4 departments, as well as many others in Latin America, are already engaged in the training of hospital pathologists. It is estimated that each department will have room for one new fellow each year, and since the program will last a minimum of 3 years, there can only be 12 fellows in the 4 departments at any one time. Stipends should vary according to the cost of living of the country where the training is taken, as well as on the family size of the fellow. Preliminary estimates vary from \$ 300.00 to \$ 600.00 per month.

5.6 Publications. - One of the objectives of the program is to facilitate communication among pathologists in Latin America. This can be accomplished by sponsoring a journal which will publish research results.

5.7 Consultants. - Two consultants per year per department.

5.8 Courses. - It is recommended that each department should conduct a teaching course or seminar in their special field of research, at least once every three years. This seminar should be attended by all the fellows in the program, regardless of their special field of interest. The figure in the budget covers travel expenses for the fellows and consummable supplies for the courses.

- 5.9 Administration.- The overhead for each department is estimated as 10 percent, in view of the less expensive cost of clerical assistance in Latin America.
- 5.10 Grants for returning fellows.- A figure appears in the third year of the program to cover the possibility of three being one or more fellows that are already advanced in their research accomplishments and would need financial assistance to become established.
- 5.11 Other.- The very nature of this project demands that unforeseeable needs be taken into consideration. The funds may be carried over to the next year's budget if not used, but they should be available to meet any unexpected circumstances.

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PAN AMERICAN HEALTH ORGANIZATION  
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PATHOLOGY CENTER: COLOMBIA  
EQUIPMENT AND FACILITIES

Universidad del Valle  
Departamento de Patología  
Facultad de Medicina  
Cali, Colombia

EQUIPO

- Sections: I - Autopsy  
II - Surgical Pathology  
III- Experimental Pathology  
IV - Geographic Pathology  
V - Forensic Pathology  
VI - Clinical Pathology  
VII- Ancillary

List of equipment.-

I - Autopsy

- 1 Refrigerator (for bodies)
- 1 Freezer (Icasa)
- 2 Autopsy tables
- 1 Electric saw (Lipshaw)
- 1 Body balance
- 3 Tissue balance
- 2 Dictaphones (Stenorette)
- Autopsy instruments (specific and general use)
- Desk, Chemicals, glassware, gadgets

II-Surgical Pathology

- 1 Electric saw (Lipshaw)
- 1 Refrigerator (Icasa)
- 1 Cryostate and microtome for frozen sections
- 3 Light microscopes (Leitz)
- 2 Light microscopes (Kinei)
- 1 Dissecting tables
- 2 Dictaphones
- 2 Equipment for offices
- 1 Intercom with two stations
- 1 Electric typewriter
- Surgical pathology instruments
- File for slides and protocols

PATHOLOGY CENTER: COLOMBIA  
EQUIPMENT AND FACILITIES

III - Experimental Pathology

A.- Electron Microscopy

- 1 Electron Microscope Hitachi (To be installed)
- 1 Microtome Porter-Blum MTI  
Glassware, chemicals, gadgets

B.- Fluorescent Microscopy

- 1 Homogenizer (Virtris)
- 1 Osterizer
- 3 Magnetic Stirrers
- 2 Bath (control of temperature) (Scanlan-Morris)
- 1 Cork perforator
- 2 Hot plates
- 1 Freezer (Indufrial)
- 2 Refrigerators (Icasa)
- 1 Deeps Freezer (Reves)
- 1 Cryostate (Harris MHO) with microtome (International)
- 2 Timers
- 1 Precision Balance (Lab. Supply, Co.)
- 2 Balances
- 1 Incubator (Fisher)
- 1 Autoclave (Castle)
- 1 High speed centrifuge (International)
- 1 Demineralizer
- 2 Ultraviolet lamps (UVL 21)
- 1 Ultraviolet microscope with photographic attachment (Zeiss)
- 1 Light microscope (Zeiss)
- 1 pH meter (Beckman)
- 1 Animal clipper and attachments (Oster)
- 1 Dictaphone (Dict-trans)
- 1 Rotator (Eberbach)
- 1 Automatic Water Still (Slokes)
- 2 Fire extinguishers (General)
- 1 Dializer (Oxford)
- 1 Typewriter
- 1 Stereoscopic microscope
- Chemicals, glassware and gadgets

IV - Geographic Pathology

- 1 Monroe Monromatic machine (Calculating Machine)
- IBM equipment for perforation and tabulation
- 4 Light microscopes (Leits)
- 1 Technicon
- 1 Equipped animal room (rats and mice)
- 2 Typewriters
- Filing and desk facilities
- 1 Store room with jars and plastic bag sealing facilities

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EQUIPMENT AND FACILITIES

V - Forensic Pathology

To be organized

VI- Clinical Pathology

To be opened in 1968

VII- Ancillary

A.- Photography

- 4 Cameras with adapters for microphotography (Leika-Leitz)
- 1 Camera (Nikon)
- 1 Dark room fully equipped
- 2 Microlight meters

B.- Tissue Laboratory

- 4 Balances (Detecto)
- 2 Microtome Knife sharpener (Lipshaw)
- 1 Frozen section microtome (Sartorius)
- 1 Fire extinguisher (General)
- 1 Dryer (Oster)
- 2 Technicon (Histokinette)
- 1 Technicon (Autotechnicon)
- 4 Microtomes (Spencer)
- 3 Water baths (Doekel and Lipshaw)
- 1 Typewriter
- 1 Microscope (Kinei)
- 3 Incubators
- 1 Refrigerator (Frigidaire)
- 1 Paraffin dispenser (Barnstead)
- Glassware, chemicals and gadgets

C.- Cytology Laboratory

- 3 Light microscopes (Leitz and Kinie)
- 1 Centrifuge (International)
- Glassware, Chemicals

D.- Offices

- 8 Fully equipped offices for staff
- 3 Fully equipped offices for secretarial work
- 1 Intercom system
- 2 Dictaphones (Stenorette)

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E.- Teaching material

- 60 Monocular microscopes (Kinei, Zeiss and Leitz)
- 1 Epidioscope (Leitz)
- 2 Microslide projectors
- 3 Slides projectors
- 1 Laboratory fully equiped for 60 students
- 1 Laboratory fully equiped for 15 residents
- 15 binocular microscopes (Kinei and Leitz)

F.- Library (Medical School)

- 8.500 books
- 800 medical journals

G.- File Room

Centralized file room for slides, protocols, photographs, gross specimens, etc.

PATHOLOGY CENTER: MEXICO  
EQUIPMENT AND FACILITIES

Escuela de Medicina  
Unidad de Patología  
Universidad Nacional Autónoma de México  
México, D.F.

I Division of Research and Clinical Pathology

- A Cytogenetics and Tissue Culture
- B Biochemistry and Immunology
- C Electron Microscopy

II Division of Anatomical Pathology

- A Surgical
- B Autopsy

III Ancillary Departments

- A Department of Histochemistry
- B Department of Medical Photography
- C Library
- D Administrative
- E Animal Rooms

List of Equipment

I-A Cytogenetics and Tissue Culture

- 1 Micro-cine-camera (ZEISS)
- 1 Incubator Heraeus
- 1 Refrigerator
- 1 Phase Microscope (ZEISS)
- 4 Light microscopes (2 Olympus, 1 Leitz, 1 Zeiss)
- glassware (specific and general use)
- 1 High pressure mercury vapor lamp
- 1 Micromanipulator (ZEISS)

I-B Biochemistry and Immunology

- 1 Cold room (-10 to + 20° C)
- 1 Refrigerated Centrifuge MSE ("MAGNUM")
- 1 Ultracentrifuge Beckman Model "L"
- 1 Deep-freeze "American"
- 2 pH-Meters (Beckman)
- 1 Spectrophotometer Coleman Universal
- 1 Spectrophotometer Coleman Junior
- 1 Spectrophotometer Zeiss PM Q11
- 1 Centrifuge Servall
- 1 Mettler Balance
- 5 Baths (Controlled Temperature)
- 1 Dissecator
- 1 Cryostat (Lipshaw)



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- 1 Electrophoretic Apparatus (LKB)
- 2 Micro-Kjeldahl apparatus
- Chemicals
- Glassware and minor installations and gadgets

I-C Electron Microscopy

- 1 Electro Microscope "Hitachi" HU-11A
- 2 Microtomes Porter-Blum MT-I
- 1 Dark Room (Fully Equipped)
- Glassware, reagents and gadgets

II Division of Anatomical Pathology (Surgical and Autopsy)

- 17 Light Microscopes (Zeiss)
- 2 Cryotomes
- 1 Laboratory
- 5 Dissecting Tables
- 1 Refrigerator
- 2 Dictaphones
- files for slides, protocols and diagnoses

III Ancillary Departments

A Histochemistry

- 6 Microtomes (Leitz, Spencer, etc.)
- 4 Baths
- 2 MSE Histokinette
- Chemicals and glassware

B Medical Photography

- 1 Leica M2 with visoflex
- 1 Edixamat "D"
- 1 Panphot Leitz
- 1 Amplifier Phocomat II-C (Leitz)
- 1 Dark Room
- Gadgets

C Library

- Suscriptions to 63 Medical, Biological and other Scientific Journals
- 600-700 Books on Medical Sciences

D Administrative

- 11 Desks
- 11 Typewriters

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E Animal Rooms

- 1 Chicken (inbred)
- 1 Rabbits, guinea pigs and rats
- 1 Mice (inbred)

Facultad de Medicina "Cayetano Heredia"  
Universidad Peruana de Ciencias Médicas y Biológicas  
Lima, Perú

- I. Servicio de Autopsias y quirúrgicas.
- II. Sección de Micología
- III. Sección de Microscopía Electrónica
- IV. Sección de estudios renales (en coordinación con la Unidad Renal)
- V. Sección de investigación.

Equipos Básicos

- 2 Fotomicroscopios Zeiss
  - Microscopía de fase
  - Microscopía de fluorescencia
- 1 Microproyector Arcovoltaico Zeiss
- 1 Criostato de Pearse
- 1 Criostato de Lipshaw
- 2 Autotechnicones
- 4 Microtomos Minot
- 2 Estufas
- 2 Microtomos de congelación Spencer
- 2 Knife sharpener
- 1 Microscopio de disección
- 2 Paraffin Dispenser
- 8 Microscopios binoculares
  - Camara fotográfica
  - Refrigeradoras
  - Estufas
- 2 Máquinas calculadoras
- 5 Máquinas de escribir
- Equipo para cirugía experimental
- Centrifugas
- Balanzas

## Freezer

### Equipo existente en el Instituto de Investigaciones de la Altura

Espectrometro de Centelleo Líquido Nuclear Chicago 720

Espectrofotofluorómetro Aminco-Howman con Osciloscopio

Espectrofotometro Zeiss PMQ II

Centrifuga Refrigerada Sorvall RC-2

Ultracentrifuga Preparatoria Beekman Modelo L

Cromatografo de Gas Perkin-Elmer 801 Detector de Llama

Cromatografo de Gas Research Sp. 600 Detector de Sr 90

Contador de Centelleo, Nuclear Chicago 186 A con Pozo y Selector de Pulso

Equipo para Electroforesis tipo Durrum, Beekman

Equipo para Cromatografía en Capa Fina

### Sección de Microscopía Electrónica

1 Microscopio Electrónico Simmens

1 Ultramicrotomo LKB

1 Refrigeradora

1 Abrillantadora

1 Centrifugadora

1 Estufa Presición

1 Balanza

1 Destilador de vidrio

1 Microscopio binocular

### Equipo de Fotografía

1 Microfilm Lamphouse type DM

1 DM Power Supply

1 Cortadora Simmon Omega

1 Prensa Simmon Omega

1 Fotorite

1 Reloj de tiempo

Department of Experimental Pathology  
Instituto Venezolano de Investigaciones Cientificas  
Caracas, Venezuela

- I Laboratory of Histochemistry
- II Laboratory of Biochemistry and Immunology
- III Laboratory of Mycology
- IV Laboratory of Tissue Culture
- V Laboratory of Electron Microscopes
- VI Library
- VII Animal Room

I Laboratory of Histochemistry

- 4 Microtomes (Leitz, Spencer, etc.)
- 1 Cryostat (ditto)
- 4 Ovens
- 4 Light microscopes
- 1 Leitz with automatic microphotographic attachment
- 2 Refrigerators
- 1 Freezer
- 1 Histokinette
- Chemicals and glassware
- 1 Mettler balance
- 2 pH meters (Beckman)

II Laboratory of Biochemistry and Immunology

- 1 Cold room, temperature - 4 to + 4 C
- 1 Sorvall refrigerated automatic centrifuge
- 1 Centrifuge Beckman model 65
- 2 Deep-freeze
- 2 pH meters
- 1 Spectronic 600
- 1 Spectronic 20
- 1 Mettler balance
- 4 Bath (control of temperature)
- 1 Electrophoretic apparatus
- 1 Warbur
- 1 Equipment for thin layer chromatography
- 1 Fractionator
- Chemicals, glassware, minor instalations and gadgets.

In addition we can use freely 1 gas chromatography,  
1 nuclear magnetic resonance (Variant) 1 equipment  
for X-ray diffraction, 1 reactor for activation ana-  
lysis, 1 infra-red spectrometer and glassware.

### III Laboratory of Mycology

- 2 Ovens for cultures
- 1 Shaking apparatus
- 1 Shaking apparatus with control temperatures
- 1 Microscope Leitz
- 1 French Press
- 1 Sorvall SS-6 ultraspeed centrifuge
- 1 Omnimixer
- 1 Bacteriological glove box

### IV Laboratory of Electron Microscope

- 1 Electron microscope Hitachi HU-11B
- 1 Electron microscope Hitachi HS-6
- 1 Electron Microscope JEM
- 2 Microtome Porter Blum M-2
- 1 Microtome Leitz
- 1 Dark room (Fully equiped)
- glassware, reagents and gadgets

### V Library

We use the Institute Library which has subscriptions to 1500 Journals and near 30,000 books.

### VI Animal Room

We use the Institute animal room which has rabbits, hamsters, mice, chickens, rats, cats and dogs.