STATUS OF MEDICAL MYCOLOGY IN LATIN AMERICA

(Item 4 of the Agenda)
STATUS OF MEDICAL MYCOLOGY IN LATIN AMERICA: A REPORT

Ref: RD 6/18  Queda  ACMR 9/4
December 1969

PAN AMERICAN HEALTH ORGANIZATION
Pan American Sanitary Bureau, Regional Office of the
WORLD HEALTH ORGANIZATION
Washington, D.C.
This document should not be reviewed, abstracted, or quoted without the agreement of the Pan American Health Organization.
# Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Survey of Institutions Visited</td>
<td>1</td>
</tr>
<tr>
<td>1.1 Venezuela</td>
<td>1</td>
</tr>
<tr>
<td>1.2 Brazil</td>
<td>4</td>
</tr>
<tr>
<td>1.3 Argentina</td>
<td>7</td>
</tr>
<tr>
<td>1.4 Colombia</td>
<td>8</td>
</tr>
<tr>
<td>1.5 Mexico</td>
<td>10</td>
</tr>
<tr>
<td>2. Conclusions</td>
<td>12</td>
</tr>
<tr>
<td>3. Recommendations</td>
<td>15</td>
</tr>
<tr>
<td>3.1 Standardization of Antigens and Methods</td>
<td>15</td>
</tr>
<tr>
<td>3.2 Notification</td>
<td>15</td>
</tr>
<tr>
<td>3.3 Exchange of Information</td>
<td>16</td>
</tr>
</tbody>
</table>
STATUS OF MEDICAL MYCOLOGY IN LATIN AMERICA: A REPORT*

To determine the competence and capability of Latin American mycological centers to provide training and research opportunities to students and investigators, a one-month survey was conducted from 19 October to 19 November 1969 involving visits to institutions in Venezuela, Brazil, Argentina, Colombia, and Mexico. The findings of this mission are reported here.

1. Survey of Institutions Visited

1.1 Venezuela

According to case reports and skin-test surveys, the prevalence of mycotic diseases in Venezuela is high. As a concomitant, there has been sustained and continuing interest in the field of medical mycology in that country. Work is being carried on actively in four centers, three of them in Caracas one in Mérida.

In general, the quality of diagnostic and research work at these centers is high. Greater financial support is needed for technicians and supplies, and there is also need to centralize and coordinate medical mycological activities, especially in Caracas.

1.1.1 National Tuberculosis Institute, Caracas

Under the guidance of Dr. José Ignacio Baldó, now Adviser to the Venezuelan Ministry of Health and Welfare, a medical mycological diagnostic, research, and training service has been established at this Institute, which has fine facilities just outside of Caracas in a park-like area known as "El Algodonal." An interest in medical mycology has long existed there, and as the

*Prepared by Dr. Libero Ajello, Chief, Mycology Section, Laboratory Division, National Communicable Disease Center, Atlanta, Georgia, USA, acting as a consultant for the Pan American Health Organization.
Institute has shifted emphasis from tuberculosis to other chest diseases more attention has been paid to the mycoses.

The Immunology Section, headed by Dr. Ladislao Pollack, has an efficient and competent diagnostic service that covers both cultural and serological studies, and the Pathological Anatomy Section's director, Dr. Angulo Ortega, is an outstanding authority on the histopathology of the systemic mycoses. Together these two investigators and their staffs share training activities and collaborate in research undertakings. The facilities at the Institute are more than adequate. In fact, they proved to be among the best noted in the survey. The buildings are well designed and are kept in excellent condition. The laboratories are fully equipped with all needed apparatus. Ample provisions exist for media and glassware preparation. The animal facilities for diagnostic and experimental purposes are adequate in size and are well maintained. The library resources are quite satisfactory and can be supplemented by the books and journals available at the Central University and the Venezuelan Institute for Scientific Research (IVIC) in Caracas.

Under the guidance of Drs. Baldó, Pollack, and Angulo Ortega, the Institute offers training of high caliber in the clinical, histopathological, and therapeutic aspects of the systemic mycoses. It also provides for laboratory diagnosis based on cultures as well as serology. The only drawback at the present time is that these men and their staffs do not and cannot devote their time and efforts exclusively to medical mycology; they must carry on work on tuberculosis and other diseases as well.

The potential for developing an outstanding mycological department at "El Algodonal" is great. Funds would be needed to obtain a full-time mycologist and technicians. Dr. Baldó has the intention of establishing such a center and, in the person of Dr. Humberto Campins, has an individual capable of planning, coordinating, and directing it. A decision will be made on this matter in the near future.
1.1.2 Institute of Tropical Medicine and Faculty of Medicine, Central University of Venezuela, Caracas

A Mycology Section has been established at the University's Institute of Tropical Medicine under the guidance of Dr. Dante Borelli. Its work is coordinated with the Mycology Section in the Department of Dermatology at the Faculty of Medicine. Undoubtedly, Dr. Borelli has the most active and productive medical mycological program in all of Venezuela at the present time. He is deeply involved in the teaching of medical mycology at the clinical level and at the same time conducts an active diagnostic service and an excellent research program.

At the Institute of Tropical Medicine much valuable material has been collected and prepared for teaching medical mycology at various levels of sophistication. This material includes:

- An extensive library of mycological texts
- A large reprint collection
- A card file of over 20,000 medical mycological references
- Histological material in the form of tissue blocks and sections from all of the mycoses
- Some 10,000 color slides and black-and-white prints on the mycoses and fungi
- An excellent culture collection

With a minimum of support, Dr. Borelli could train physicians, technicians, and graduate students in the fields of clinical and laboratory diagnosis, therapy, ecology, epidemiology, and taxonomy.

1.1.3 Department of Microbiology, Venezuelan Institute for Scientific Research (IVIC), Caracas

Excellent facilities for carrying out basic studies with the mycoses and their etiological agents are available at this institute. The laboratories are beautifully laid out and equipped and supported by glassware and media preparation services. There Dr. Luis Carbonell and his staff have done outstanding
work on the ultrastructure and biochemistry of human pathogenic fungi. Facilities and staff for carrying out basic studies on the immunological aspects of medical mycology will be on hand in the near future.

This institute is clearly the place for certain types of basic studies on a graduate and postgraduate level. Work done there would be at least comparable, if not superior, to that done anywhere else in the world. The only drawback for the immediate future is the fact that Dr. Carbonell has just gone on sabbatical leave and will be spending a year or more at Harvard University. Until he returns, mycological work at the Institute will be relatively inactive.

1.1.4 Institute of Pathological Anatomy, University of the Andes, Mérida

At this institute in Mérida, small-scale, but sound, medical mycological work is being carried out. Dr. Karlhanns Salfelder, who heads the Institute, has become an authority on the histopathology of the systemic mycoses and has had considerable experience with histoplasmosis and paracoccidioidomycosis. At the present time, Dr. Salfelder is carrying out ecological studies on Paracoccidioides brasiliensis with a view to determining the natural habitat of this important fungus.

Dr. Salfelder currently has facilities for three or four students, but soon he will be moving from his present quarters to an ultramodern 600-bed hospital where provisions have been made to accommodate an increased number of students and to carry out mycological as well as histological work. Support will still be needed for technicians and experimental animals.

1.2 Brazil

Brazil has long had a deep interest in the mycoses. Fundamental work on chromoblastomycosis, paracoccidioidomycosis, and keloidal blastomycosis was carried out in this country in the early 1900's. Today the most important work in medical mycology is essentially confined to three areas: Rio de Janeiro, São Paulo, and Santa Maria.
It is particularly in São Paulo and Santa Maria that medical mycological work of high quality is being carried out. Antigens for various types of serological procedures and for skin tests are produced and are available for distribution. Facilities and staff for training physicians and research investigators are available. Students would be welcomed and would receive excellent guidance and support.

1.2.1 Rio de Janeiro

For many years much medical mycological work was carried out at the Oswaldo Cruz Institute and the city's several medical schools and hospitals. One of the early pioneers in this field was Dr. Olympio da Fonseca, who began a culture collection at the Institute.

Currently, two investigators, Drs. Antar Padilha Gonçalves and José L. Miranda, are striving to carry out work of quality in Rio de Janeiro. Dr. Miranda, who has contributed to the efforts carried out at the Oswaldo Cruz Institute, is also affiliated with the new suburban medical school, Gama Filho, where he hopes to be able to develop a mycological service. Dr. Padilha is chief of the Dermatology Service at the National Cancer Institute in the Rio de Janeiro School of Medicine and Surgery. There, and at the General Polyclinic of Rio de Janeiro, he is prepared to train physicians on the clinical aspects of all the mycoses. For the present, however, most of his time is devoted to his private practice. Until more active programs can be built up again in Rio de Janeiro, it would be better to direct students elsewhere.

1.2.2 Faculty of Medicine, University of São Paulo

In São Paulo there is a well-organized mycological center under the direction of Dr. Carlos da Silva Lacaz. Basic courses in medical mycology are presented at the Faculty of Medicine in the Department of Microbiology and Immunology and also at the São Paulo Institute of Tropical Medicine. Facilities are adequate, and a fine collection of cultures, histological
preparations, and reference material is available. Graduate work in immunology and therapy and also in ecology is being conducted by Dr. Lacaz and by Drs. Celeste Fava Netto and Paulo S. Minami of his staff.

A unique feature in this city is that the State of São Paulo gives its university sufficient monetary support to enable the faculty to pursue full-time teaching and research.

At the Escola Paulista de Medicina, a Regional Library of Medicine has been created with support from the Government of Brazil and PAHO and with technical and other assistance from the U.S. National Library of Medicine and The Commonwealth Fund. This library is currently able to provide a literature and reference service to biomedical investigators, educators, and practitioners in Brazil and, before long, its facilities will be at the disposal of the biomedical community throughout South America.

1.2.3 Faculty of Medicine, University of Santa Maria

At the Faculty of Medicine in Santa Maria, State of Rio Grande do Sul, a small but excellent medical mycological service has been developed by Dr. Arturo T. Londero. Under his direction, diagnostic services and teaching and research are carried out. The existing facilities are old but adequate. In a year or so, however, a new university center on the outskirts of the city will be completed. There a new hospital and modern laboratories and classrooms will be available.

Dr. Londero has an extensive set of publications on medical mycology and a fine culture collection. Histological material in the form of tissue blocks and histological sections has been gathered over the years and is used for teaching and research. He has done clinical, ecological, and epidemiological work of the highest quality.

The opportunities for training and carrying out various types of research are excellent in Santa Maria. The University has a fine medical library and other resources of value in teaching and research.
1.3 Argentina

1.3.1 Faculty of Medicine, University of Buenos Aires

In Argentina, medical mycological work is essentially confined to Buenos Aires, where excellent staff and facilities for training and research in this field are available.

During a long and productive career, Dr. Pablo Negroni has developed an excellent mycological program at the Faculty of Medicine. In 1948 a Mycological Center was established in the Department of Microbiology and Parasitology. There a large culture collection is maintained for teaching and research purposes. An excellent medical mycological library consisting of reprints, text books, monographs, and theses has been accumulated over the years. The medical school's main library has subscriptions to a large number of journals as well as an extensive collection of monographs on all fields of medicine. Adequate lecture halls and laboratories are available for instruction and research.

An active diagnostic service that deals with clinical specimens, sera, and cultures serves the various hospitals of the city and the nation. The serology laboratory prepares its own antigens for skin and serological tests.

Courses are given each year for medical students and medical technicians. In addition, an intensive one-month course, limited to 12 graduate students, has been offered annually since 1965. Cultures, histological material, and patients with all types of mycotic infections are available for study.

In order to stimulate interest in medical mycology in other parts of Argentina, a three-day mycological symposium is held every year on a rotational basis in the cities of Córdoba, La Plata, Rosario, Tucumán, and Buenos Aires.
A Commission for the Study of Pulmonary Mycoses was established in 1963. It is concerned with promoting the following objectives in this field of medicine:

- Performance of diagnoses using all available techniques
- Hospitalization and treatment of cases of deep mycoses in specialized hospital centers
- Maintenance of a national register of cases
- Conduct of skin test surveys for coccidioidomycoses, histoplasmosis, etc., in various parts of the country using standardized lots of antigen
- Training of physicians and microbiologists from the interior in medical mycology
- Distribution of information on the mycoses to physicians throughout the nation
- Provision of epidemiological and prophylactic services in areas where various mycoses are endemic

Not all these goals have been reached as yet, owing to the shortage of trained personnel and the limited time that the Commission has been in existence.

1.4 Colombia

1.4.1 Faculty of Medicine, University of Antioquia, Medellín

Medical mycological competence in Colombia is centered essentially in the Mycology Laboratory at this institution, where Dr. Angela Restrepo has created an outstanding diagnostic training and research center. Facilities are spacious and airy, well planned, and well equipped. The laboratory is staffed with two technicians, one animal caretaker, and a secretary. One or two special students are usually available to work on projects.

Dr. Restrepo works in close liaison with Dr. Mario Robledo, Professor of Pathology; Dr. Gonzales Calle, Chief of the Dermatology Department; and Dr. Jorge Restrepo, Chief of the TB Sanatorium in the Respiratory Disease Control Center.
The Mycology Laboratory gives diagnostic support, both cultural and
serological, to the University Hospital and other medical institutions in the
city. Collaborative research projects are carried out. Dr. Restrepo has de-
veloped the best serological procedures for the study of paracoccidioidomyco-
sis. The procedures are useful both in diagnosis and for epidemiological
studies.

An excellent long-term epidemiological and ecological study of para-
coccidioidomycosis is being carried out. Over 90 families are under observ-
vation. Eventually it is hoped that clues will be obtained regarding the
natural reservoir of *Paracoccidioides brasiliensis*.

Courses for medical students and technicians are regularly presented.
The University of Antioquia would be an excellent place for training and re-
search in the immunology of mycotic diseases, diagnosis, and epidemiology.
The laboratory, however, needs funds for animals, supplies, and technicians,
especially now that Dr. Restrepo's NIH grants have ended.

1.4.2 International Center for Medical Research and Training, University of
Valle, Cali

This center, which functions in cooperation with Tulane University
under NIH support, has facilities for the study of various tropical diseases
by students from the United States. A new microbiology building at the Un-
iversity of Valle has central air conditioning, well-designed laboratories,
and the most modern animal facilities. Under Dr. Donald Greer, an ICMRT
fellow, a medical mycological program has just been initiated. Excellent
rapport has been established with the staff of the University's medical
school and hospital and the Social Security Hospital.

Studies on the dermatomycoses and paracoccidioidomycosis have begun.
Dr. Greer has made the medical community aware of the high prevalence of my-
coses in this part of Colombia and is providing a first-rate diagnostic
service. His activity is mutually beneficial to all involved. When a counterfeit mycologist is obtained, the University of Valle will have competence in the field of medical mycology for the first time and will be able to provide training and research programs.

1.5 Mexico

In Mexico, physicians as well as microbiologists can obtain training and degrees in all aspects of medical mycology. In addition, opportunities exist for research on the mycoses and their etiologic agents. Mexico is unique in Latin America in that Master's and Ph.D. degrees are granted in this field. Such graduate programs are available at the National Polytechnic Institute, in its National School of Biological Sciences, and at the University of Mexico. Three active centers, all in the Federal District, are reported on here.

1.5.1 Pascua Dermatological Center, México, D.F.

Dr. Pedro Lavalle has virtually singlehandedly created a first-rate diagnostic program for mycoses at this center. Currently he has two half-time technicians: one works mornings; the other, afternoons. Clinical material is extremely rich. Patients are referred to the center not only from the Federal District but also from the rest of the country. Courses in medical mycology are given to physicians throughout the year.

The Pascua Center would be an excellent place for physicians to receive practical training on the clinical aspects of the cutaneous mycoses. Dr. Lavalle has a good culture collection and a wealth of histological material. Resources are limited, however, and there would be not too much opportunity for research studies.
1.5.2 Department of Tropical Dermatology and Laboratory of Mycological Studies, Institute of Tropical Health and Diseases, México, D.F.

Under the direction of Dr. Antonio González Ochoa, an outstanding medical mycological center has been created at this institute. Activities are divided among teaching, diagnosis, and research. Each year a three-month course with stress on the clinical aspects and therapy of the mycoses as well as laboratory diagnosis is given to physicians who are entering dermatology.

In collaboration with the National Polytechnic Institute and its National School of Medical Sciences, a one-year course in medical mycology is offered for Master's and Ph.D. degree candidates.

Cultures, tissues, and sera from patients with suspected mycoses are studied. The material comes from the Social Security Hospital, from other hospitals in the city, and from elsewhere in the country.

Epidemiological and therapeutic studies of high quality and importance are carried out under Dr. González Ochoa's direction. The medical mycological center is well staffed with competent technicians, secretaries, animal caretakers, etc. Beds for selected patients are available in a small hospital located on the upper floor of the building. Ample space, equipment, and supplies are provided, and the Institute is well prepared to accommodate students from various parts of Mexico and from the rest of Latin America as well.

1.5.3 Faculty of Medicine, University of Mexico, México, D.F.

Dr. Luis Bojalil, Director of the Department of Human Ecology, organized a Mycology Section early in 1969. The program will be headed by Dr. Rubén Alvarez, who has just left for a year of postgraduate training at the Pasteur Institute's Mycology Laboratory in Paris. His associate, Mr. Ramón Lara, is currently working on his doctorate in medical mycology under the direction of Dr. González Ochoa at the National Polytechnic Institute. A graduate program leading to the Master's degree has been initiated. The requirements
for the degree include two years of courses in the broad fields of microbiology, mathematics, and chemistry as well as specific medical mycologic courses. These are followed by one year of thesis work and graduate seminars. At present one student, a Brazilian, is enrolled. Within two or three years, a Ph.D. program will be inaugurated.

The following disciplines are covered in the Department of Human Ecology: general microbiology, medical microbiology, parasitology (general and medical), entomology, medical mycology, and immunology. The staff is composed of nine full-time professors. Twelve fellowships are available for graduate students.

2. Conclusions

Several of the mycology centers mentioned in this survey are supported at a minimal level. Salaries are frequently too low to permit the directors to work on a full-time basis. Supporting funds are insufficient to provide for adequate staffs or the purchase of experimental animals and needed equipment. In the case of some institutions - for example, those in Mérida, Venezuela, and Medellín, Colombia, and the Pascua Dermatological Center in Mexico - a relatively small sum of additional money, approximately $15,000 a year, would provide the opportunity to fully staff and supply these programs and lead to a significant increase in their effectiveness in training, diagnostic services, and research.

In the other institutions surveyed, students and visiting investigators could be accommodated with little or no difficulty. Training and research opportunities in specific fields are available in these institutions as follows:

Argentina

University of Buenos Aires, Faculty of Medicine, Mycological Center
- Clinical diagnosis and treatment
- Laboratory diagnosis covering isolation and identification of the etiologic agents and also serological diagnosis
Brazil

University of São Paulo, Department of Microbiology and Immunology
- Clinical diagnosis and therapy
- Laboratory diagnosis covering isolation and identification of etiologic agents and also serology
- Histopathology
- Immunology of the mycoses

University of Santa Maria, Faculty of Medicine, Institute of Parasitology and Mycology
- Clinical diagnosis and therapy
- Laboratory diagnosis covering isolation and identification of etiologic agents
- Histopathology
- Research in the fields of ecology and epidemiology

Colombia

University of Antioquia (Medellín), Microbiology Section and Pathology Department
- Laboratory diagnosis
- Histopathology
- Research in ecology, immunology, and serology

Mexico

Pascua Dermatological Center
- Clinical diagnosis and therapy of cutaneous and subcutaneous mycoses
- Histopathology of the above mycoses
- Laboratory diagnosis

Institute of Tropical Health and Diseases
- Clinical diagnosis and therapy of the mycoses
- Histopathology
- Immunology and serology
- Graduate training leading to Master's and Ph.D. degrees in medical mycology in conjunction with the National Polytechnic Institute
- Research in ecology, immunology, and therapy

University of Mexico, Faculty of Medicine

- Graduate program in medical mycology for Master's degree (currently available) for Ph.D. degree (in the near future)

Venezuela

National Institute of Tuberculosis

- Clinical diagnosis and therapy of pulmonary mycoses
- Histopathology
- Cultural and serological diagnosis

Central University, Institute of Tropical Medicine

- Clinical diagnosis and therapy
- Histopathology
- Cultural diagnosis
- Ecological research
- Taxonomic research

Venezuelan Institute for Scientific Research (IVIC)

- Postgraduate research on the ultrastructure, biochemistry, and immunology of fungi (the last subject in the near future)

University of the Andes, Mérida

- Histopathology of the mycoses
- Ecological studies
3. Recommendations

3.1 Standardization of Antigens and Methods

There is an urgent need to standardize the antigens and methods used in the immunodiagnosis of the mycoses in Latin America. Virtually every laboratory has its own preparations and methods. Little or no attempt has been made to determine their relative reactivity and specificity with proper controls.

Formation of a study group sponsored by PAHO and headed by a recognized expert is recommended to set up standards and to evaluate all immunological reagents and procedures.

3.2 Notification

Although medical mycologists are aware of the prevalence and high incidence of the mycoses in the Americas, these diseases are generally considered to be rare and of minor public health importance by administrators of health services and programs. Since the mycoses are not reportable diseases, specific information on the morbidity and mortality that they cause is unavailable.

An effort should be made through PAHO to have the mycoses placed in the category of reportable diseases. A mechanism through which this could be accomplished may already exist. During the XV Pan American Congress on Tuberculosis and Pulmonary Diseases, held in Buenos Aires in 1966, a resolution was passed by the Union of Latin American Tuberculosis Societies recommending that each member country establish a Coordinating Commission for the National Study of the Mycoses. Several countries have already done this. In cooperation with these commissions, the procedures necessary to initiate reporting could be determined and implemented.
3.3 Exchange of Information

An Advisory Committee on Medical Mycology, formed under the auspices of PAHO, would be of value in facilitating the exchange of information and the coordination of research programs. It could also help to plan and establish regional centers for diagnosis and training where needed. Data on antigens, reference sera, and cultures and epidemiological and statistical information could be collected and distributed.