

REVIEW OF LITERATURE ON MEDICAL MYCOLOGY IN THE PHILIPPINES, 1955-1962

by

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(I.XI.1962)

The Philippines is an archipelago of about 7,100 tropical islands situated in the western Pacific Ocean 600 miles off the southeast corner of Asia. Located only about 15° north of the equator, the country has its share of tropical diseases, such as malaria, yaws, filariasis, schistosomiasis, typhoid fever, dysentery, intestinal parasitism, and mycotic infections.

The beginnings of medical mycology in the Philippines may be traced to a number of publications by a singular group of American scientists, including STRONG, MUSGRAVE and WADE, who worked in the Bureau of Science in Manila during the early years of the American regime in the Philippines, at the turn of the century. STRONG¹ in 1906, described what is probably the first recorded case of mycotic infection in the Philippines. The patient was a 35-year old Filipino woman with a skin lesion simulating a Delhi boil and exhibiting *Histoplasma*-like organisms in tissue sections. These early reports in the Philippine Journal of Science were followed by a long period of inactivity, interrupted only by occasional articles on mycetoma, rhinosporidiosis and candidiasis. After the Second World War, however, with the return of Filipino dermatologists and microbiologists who trained in the United States and with the organization of a Medical Mycology Unit in the Department of Microbiology of the Institute of Hygiene in Manila, there was an upsurge of interest and activity in the study of fungous diseases. SIMUANGCO² in 1955, reported on the status of fungous diseases in the Philippines and reviewed the literature up to that year.

The present review is a critical survey of publications pertaining to medical mycology in the Philippines from 1955 through June, 1962.

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INCIDENCE OF FUNGOUS DISEASES

In 1955, SIMUANGCO² reported on the incidence of fungous diseases in the Philippines based on data cooperatively compiled by the Philippine Dermatological Society from the public dispensaries of four major hospitals in Manila. Mycotic infections accounted for 13.94% of all skin diseases seen during 1952 to 1954 (3,372 cases of a total 24,179 patients with skin disorders). Only 11 of the 3,372 patients were considered to have had deep mycotic infections; the vast majority remaining had superficial mycotic infections. A breakdown of the data showing the incidence of the different superficial mycotic infections is shown in Table I; tinea pedis and tinea circinata were the two most common types.

TABLE I.
Percentage Distribution of Cases of Superficial Mycoses According to Type of Lesion (Dispensary Cases), Manila, 1952—1954.
(SIMUANGCO²)

Type of Lesions	Number of Cases	Per Cent
Tinea pedis	958	28.51
Tinea circinata	677	20.14
Tinea cruris	545	16.22
Tinea manuum	530	15.77
Tinea flava	519	15.44
Tinea capitis	59	1.75
Tinea unguium	57	1.69
Tinea nigra	9	0.27
Tinea imbricata	7	0.21
Total	3,361	100.00

Among the patients seen in the outpatient skin clinic of the University of Santo Tomas Hospital during 1952 and 1953, GUZMAN³ found mycotic dermatoses (7.9%) to be the fourth most common, following allergic dermatoses (14.5%), pyodermas (14.3%) and seborrheic dermatoses (8.2%).

Among the patients seen in dermatological private practice in Manila from October, 1956 through March, 1958 by BOCOBO⁴, mycotic infections (17.3%) were second only to the allergic dermatoses (32%). The different fungous infections diagnosed, numbering 132 out of a total of 763 diagnoses of skin disease, were as follows:

Tinea pedis	41
Tinea versicolor	38
Tinea cruris	18
Tinea corporis	15
Candidiasis	15
Tinea unguium.	3
Tinea manuum.	1
Erythrasma	1
Total	132

Among the patients referred to the Department of Microbiology, Institute of Hygiene for mycological examination during the period from January, 1953 through October, 1961, REYES & JACALNE⁵ were able to demonstrate and identify 285 causative fungi. Of these, 150 (52.6%) were dermatophytes, 117 (41%) were *Candida albicans*, 9 (3.2%) were *Aspergillus* species, and 9 (3.2%) were *Malassezia furfur*.

TINEA VERSICOLOR

Tinea versicolor is rampant among Filipinos. The true incidence of the condition is much greater than the 2.1% incidence reported by SIMUANGCO² inasmuch as Filipinos, particularly those belonging to the lower socio-economic classes, ignore this mild, superficial disorder and do not seek medical help. It is the fifth most frequently encountered skin disease in dermatologic private practice in Manila, constituting 5% of the total number of diagnoses made⁴.

In contrast to the cases seen among Caucasians in temperate countries, the most prevalent type of *tinea versicolor* in the Philippines is the pseudoachromic form characterized by hypopigmentation of the involved areas. This form has been more appropriately designated as "tinea flava" by CASTELLANI. A number of patients, though, show the mixed form, with both fawn-colored and hypopigmented lesions in the same areas. The organisms seen in KOH mounts of scales from the lesions of *tinea flava* reveal morphological characteristics similar to those of *Malassezia furfur* found in lesions of *tinea versicolor*.

DERMATOPHYTOSES

Flora-

Of the 150 isolates of dermatophytes obtained by REYES & JACALNE⁵ from patients with *tinea*, *Trichophyton rubrum* was the most common. It numbered 60, comprising 40% of the total. Other species were isolated in the following order of frequency: *Trichophyton mentagrophytes*, 28 (18.7%); *Microsporum canis*, 25 (16.7%); *Trichophyton tonsurans*, 19 (12.7%); *Microsporum gypseum*, 8 (5.3%); *Epidermophyton floccosum*, 6 (4%); and *Trichophyton concentricum*, 4 (2.6%).

Of the total 60 strains of *Trichophyton rubrum* isolated, 20 (33.2%) were from infections of the glabrous skin, 33 (55%) were from involvement of the groins, and 7 (11.8%) were from *tinea* of the feet. The lesions produced by this fungus were essentially of the chronic inflammatory type which persisted for long periods of time. They tended to become hyperpigmented and widespread, involving large areas of the body. In one patient, the lesions covered almost the whole trunk and upper and lower extremities, while in another, the lesions covered the abdomen, a large part of the back

groins, the legs and feet, and the face. Similar observations were made previously by BOCOBO & GUTIERREZ⁶ among their cases of trichophytosis rubrum.

The 28 strains of *Trichophyton mentagrophytes* were isolated from lesions of the glabrous skin (10), feet (8), scalp (6), groins (3), and nails (1). All 25 isolates of *Microsporum canis*, 15 of the 19 isolates of *Trichophyton tonsurans*, and 4 of the 8 isolates of *Microsporum gypsum* were cultured from lesions of the scalp. Four of the 6 isolates of *Epidermophyton floccosum* were obtained from the groins.

Tinea Capitis-

The first cases of tinea capitis in the Philippines, with confirmation of the clinical diagnosis by cultural methods, were mentioned by BOCOBO & GUTIERREZ⁶. They obtained *Trichophyton violaceum* from two Chinese children who just returned from a vacation on the Chinese mainland. The next cases described were those reported by SIMUANGCO & HALDE⁷ who isolated *Trichophyton megnini* from a 7-year old Filipino girl and *Trichophyton tonsurans* from a 6-year old Chinese-American boy. The authors surveyed the schools where the patients studied; of 2,387 school children, not a single other case of tinea capitis was uncovered. They expressed the belief that tinea capitis is uncommon in the Philippines and does not present a public health problem. GUZMAN, GARCIA & LOZANO⁸ reported another case in a 7-year old Spanish-Filipino girl caused by *Microsporum canis*.

In a subsequent article, SIMUANGCO, HALDE & REYES⁹ reported on 21 cases of tinea capitis seen during the period from 1950 to 1955. Successful cultures from 19 of the cases gave the following organisms in the order of frequency: *Trichophyton violaceum*, 9; *Trichophyton tonsurans*, 6; *Microsporum canis*, 2; *Trichophyton megnini*, 1; and *Microsporum gypsum*, 1.

The ages of the children varied from 4 1/2 years to 13. The sex distribution showed a 3:1 ratio (16 males to 5 females). Most cases occurred in low-income families who lived in congested districts.

There were 10 Chinese and 11 Filipinos in the group. The data confirm the preponderance of *Trichophyton violaceum* as the causative organism of tinea capitis among Chinese. This was followed in frequency by *Trichophyton tonsurans*. Among Filipinos, there was an almost equal distribution in incidence of the organisms: *Trichophyton tonsurans*, 3; *Trichophyton violaceum*, 2; and *Microsporum canis*, 2.

A survey of 3,617 Filipino and 2,476 Chinese school children in Manila schools and of 385 school children belonging to pagan tribes in northern Luzon and in Mindanao was made. Three cases of tinea capitis were discovered among the Chinese, but none among the Filipinos.

REYES recounted his experiences with tinea capitis in two articles^{5,10}. He recorded 51 patients, all Filipinos. The organism he

isolated most frequently was *Microsporium canis* (25), followed by *Trichophyton tonsurans* (15), *Trichophyton mentagrophytes* (6) and *Microsporium gypseum* (5). It is to be noted that from this all-Filipino group of children, *Trichophyton violaceum* was not isolated even once.

Microsporium audouini has not yet been isolated in the Philippines, despite the sizeable number of American families staying in the country.

Tinea Corporis-

Trichophyton rubrum is the most common cause of tinea corporis. Of 41 cases reported by REYES & JACALNE⁵, 20 (48.8%) were caused by this organism, followed by *Trichophyton mentagrophytes*, 10; *Trichophyton tonsurans*, 4; *Microsporium gypseum*, 4; *Microsporium canis*, 2; and *Epidermophyton floccosum*, 1. This confirmed the previous finding of BOCOBO & GUTIERREZ⁶.

Tinea cruris-

Results of cultural work among Filipino cases of tinea cruris indicate disagreement with reports from other countries, i.e., that the major causative organism of tinea cruris is *Epidermophyton floccosum*. Reports both from REYES & JACALNE⁵ and from BOCOBO & GUTIERREZ⁶ gave *Trichophyton rubrum* as the preponderant causative fungus among their cases of tinea cruris. Clinically, the form of tinea cruris caused by *Trichophyton rubrum* has a tendency to spread to adjacent areas, such as the pubic region, the lower abdomen, the buttocks and the thighs.

Tinea pedis-

REYES & JACALNE⁵ gave almost equal frequency of isolation of *Trichophyton mentagrophytes* (50%) and *Trichophyton rubrum* (43.7%) among their cases of tinea pedis. In three previous surveys made by BOCOBO and his associates^{6,11,12}, *Trichophyton mentagrophytes* predominated, constituting 90-100% of the isolates.

Tinea unguium-

According to REYES & JACALNE⁵, onychomycosis is infrequently seen. *Trichophyton rubrum* and *Trichophyton mentagrophytes* were the organisms isolated from the cases seen.

Tinea Imbricata-

From personal observations, SIMUANGCO² regarded tinea imbricata as one of the major skin diseases among the Mohammedan, and also possibly the pagan, tribes of the Philippines. In one Moro (Mohammedan Filipino) village, she found it occurring in an almost epidemic form. The disease is seldom seen in Manila and the few cases seen come from the regions in which these tribes live. REYES & JACALNE⁶ recorded the isolations of *Trichophyton concentricum* from 4 cases of tinea imbricata.

Isolation of Dermatophytes from Soil-

Using the "hair baiting" technique of VANBREUSEGHEM, REYES¹³ recovered *Microsporum gypseum* from 23 (22.1%) of 104 soil samples collected from various parts of Manila and surrounding areas. The author considered the soil as the natural habitat of the fungus and concurred with the view of AJELLO that the soil is the main source of infection in human and animal microsporosis gypseum.

OTOMYCOSIS

SIMUANGCO² in her report on the status of fungous diseases in the Philippines stated that otomycosis is prevalent in the country. She cited the isolations of *Aspergillus fumigatus* from one case by AFRICA and of *Aspergillus niger* and *Aspergillus clavatus* each from two cases by HALDE. REYES & JACALNE⁶ reported 9 cases with positive KOH examinations and cultures for colonies of *Aspergillus* with black or greenish yellow surface growth. No attempts at species diagnosis were made.

CANDIDIASIS

HALDE & ARAGON¹⁴ studied the incidence of yeast-like organisms in the lower genital tract of 171 pregnant and 16 non-pregnant Filipino women. They were able to isolate such organisms from 44 (25.7%) of the pregnant women, but not from the non-pregnant women.

Of the Candidas, *Candida albicans*, *Candida tropicalis*, *Candida krusei*, *Candida guilliermondi*, and *Candida stellatoidea* were isolated. The importance of mycotic infection as the cause of vulvovaginitis and pruritus vulvae in pregnant women was emphasized since 39.3% of the cases showed abundant growth of *Candida albicans* or *Candida tropicalis* in culture. Conversely, the presence of these yeast-like organisms, even *Candida albicans*, in the vagina of pregnant women did not mean they would develop vulvovaginitis. Nearly one-fourth (22.5%) of the asymptomatic women had various species of these organisms in the vagina.

REYES & REYES¹⁵ determined the presence of *Candida albicans* in the mouths of 509 Filipino children with no detectable lesions. The ages ranged from 3 months to 10 years. Isolates of *Candida* were obtained from 162 (31.8%) and of these, 119 were *Candida albicans*. This indicated that one out of five children with normal mouths harbored *Candida albicans*, posing a problem in the cultural confirmation of oral candidiasis.

The same authors¹⁶ also examined 5,722 children who consulted the Outpatient Pediatric Clinic of the Philippine General Hospital. They searched for mouth lesions suggesting oral candidiasis. Sixty-eight patients (1.19%) presented such lesions in the form of whitish patches of varying sizes, frequently located on the tongue and the

TABLE II.

Frequency of Isolations of Candida sp. from 4,940 Different Clinical Samples.
(RODA, AGUIRRE & MIJARO¹⁹)

Source of Sample	Per Cent Positive for <i>Candida</i> sp.
Mouth	31.89
Throat	18.77
Vulva	11.39
Vagina	0.73
Posterior Fornix	0.39
Normal Skin	1.80
Diseased Skin	10.68
Rectum	10.24
Stools	4.17
Ear	3.84

buccal mucosa. Direct microscopic examination of smears taken from these 68 patients showed 37 (54.4%) positive for oval budding cells and hyphal elements suggesting *Candida*. Cultures from the same group showed 39 (57.35%) positive for *Candida*, of which 35 were identified as *Candida albicans* and 4 as *Candida tropicalis*. The organisms were recovered in large numbers in all except two cases. They considered a case as candidiasis only if the patient showed suggestive lesions, if the tissue forms of the organism were demonstrated microscopically, and if the organism were recovered in large numbers by culture. Thus, the incidence of proven oral candidiasis among these Filipino children was relatively low (0.65%). The authors discussed the possibility of an even lower incidence among healthy children inasmuch as most of the children they examined were malnourished, debilitated, chronically ill, or had taken antibiotics.

VIOLA & RODA¹⁷ described a case of bronchopulmonary candidiasis in a 42-year old, male, diabetic Filipino whose main complaints were right-sided chest and back pains, dyspnea, productive cough, fever and chills. The X-ray examination showed a homogeneous density suggestive of right hydrothorax, with the horizontal superior border between the 6th and 7th posterior ribs. Extension of this density toward the apex could be seen along the periphery of the lung. Smears and cultures of the sputum were positive for *Candida albicans* which was proven pathogenic by rabbit inoculation. The patient made an uneventful and rapid recovery with the administration of mysteclin (tetracycline and mycostatin).

SEPULVEDA & IBARRA¹⁸ discussed in a preliminary report the treatment of 9 cases of monilial vulvovaginitis with mycostatin. They obtained clinical improvement in 4-17 days, with diminished erythema and pruritus.

In 1957, a Symposium on Candidiasis was held in Manila under the sponsorship of the Philippine Medical Association and the

E. R. Squibb and Sons, Company. The results of the following studies were presented.

RODA, AGUIRRE & MIJARO¹⁹ examined 4,940 clinical samples for *Candida*. Their results are shown in Table II. Most of the strains were isolated from the mouth, the throat, the vulva, the skin and the rectum. The organisms were detected five times more frequently in diseased than in normal skin.

The frequency of isolation of the different species of *Candida* was as follows: *Candida albicans*, 46.1%; *Candida tropicalis*, 36.91%; *Candida krusei*, 15.43%; *Candida pseudotropicalis*, 1.17%; and *Candida stellatoidea*, 0.39%.

All strains, except those of *Candida krusei*, were sensitive to mycostatin.

AUSTRIA²⁰ reported on involvement of the digestive tract. In a period of six months, seven cases of stomatitis were seen and all except one were positive for *Candida albicans*. Of 356 patients with no mouth lesions, 129 or 35.23 % were positive for *Candida albicans*, *Candida tropicalis*, *Candida krusei* or *Candida stellatoidea*, with the first two being most prevalent.

Of 32 patients with no apparent stomach or duodenal lesions, the gastric juices of 81.25% were positive for *Candida albicans*, *Candida tropicalis* or *Candida krusei*. The author concluded that *Candida albicans* is a frequent inhabitant of the normal human mouth and stomach.

SIMUANGCO, FERNANDEZ, CAMPOS, ORTIZ & JACALNE²¹ reported on cutaneous candidiasis. At the Philippine General Hospital, 57.1% of 147 consecutive patients clinically suspected of having fungous disease of the skin were proven to have candidiasis. At the North General Hospital, another group including patients with all types of dermatological disease showed an incidence of 10.61% of candidiasis. *Candida* was present in 7 of 100 patients with normal skin.

In the treatment of 131 cases of cutaneous candidiasis with mycostatin, remarkable improvement was obtained in a large majority and complete cure in some. Contact dermatitis due to the local use of the drug was observed in 9 patients or 6.87% of the cases.

GUERRERO, BELMONTE, NUÑEZ & RASAY²² investigated the incidence of candidiasis in infants and children in a number of nurseries and pediatric wards of Manila hospitals. They examined 318 cases and obtained *Candida* in 100 (31.44%). Of these 100 with positive cultures, 21 had definite lesions of candidiasis, mostly in the oral cavity and pharynx. The predominating organisms were *Candida albicans* and *Candida tropicalis*. The organisms were found most often in patients receiving antibiotics for six days or more. Mycostatin was found effective in the treatment of the cases.

SEPULVEDA, RODA, IBARRA & AGUIRRE²³ examined 947 female patients for *Candida* in the lower genital tract: 146 or 15.42% were positive, 79 of whom had vulvovaginal symptoms and 67 were

asymptomatic. The most common species isolated were *Candida albicans* and *Candida tropicalis*. Pregnancy was a predisposing factor in vaginitis due to *Candida albicans*. Treatment of vulvovaginal candidiasis with mycostatin gave encouraging results.

A similar study was made by ARAGON & DEL ROSARIO²⁴ on 200 pregnant women in the second and third trimesters of pregnancy. Eighty-seven or 43.5% had positive cultures for *Candida*, 36 of whom had symptoms of vulvovaginitis. *Candida albicans* and *Candida tropicalis* usually gave rise to symptoms while *Candida krusei* and *Candida stellatoidea* were non-pathogenic. The use of mycostatin was preferred to gentian violet because of better therapeutic results and greater ease of administration.

RECIO & DE LEON²⁵ found *Candida* in the perianal region of one out of 7 Filipinos who were clinically asymptomatic and in the rectosigmoid area of one out of eight. *Candida albicans* and *Candida tropicalis* comprised four-fifths of all the isolated strains. Individuals with positive smears from the perianal, but negative from the rectosigmoid areas were seen. This was explained by differences in pH. The mere presence of *Candida* in these areas did not necessarily give rise to pathologic changes and symptoms.

Of the 117 isolates of *Candida albicans* obtained by REYES & JACALNE⁶ 70 were from cases of oral candidiasis, 36 were from intertriginous lesions, and 11 were from nail involvement.

CHROMOBLASTOMYCOSIS

The first case report of chromoblastomycosis in the Philippines was made by SIMUANGCO & HALDE²⁶. The patient was a 58-year old, male farmer who complained of warty and cauliflower-like, ulcerated lesions on the right foot and leg. The initial lesion, of 25 years duration, was an irregularly shaped, verrucous plaque, 12 × 6 cm in diameter, occupying two-thirds of the inner aspect of the right foot.

KOH mounts and histological sections of the lesions revealed the characteristic brownish, thick-walled bodies of the organism which was identified in cultures as *Fonsecaea compactum*. The authors claimed this to be the third report in the literature of the isolation of this fungus from a patient.

The patient improved with X-ray treatments, cryotherapy, and administration of potassium iodide.

MADUROMYCOSIS

In 1960, BOCOBO, DE LEON & REYES²⁷ published the first description in the Philippines of a case of maduromycosis with black granules. Cases characterized by yellow or white granules had been described previously in Philippine literature. The patient was a 37-year old, male, Filipino farmer. The organism was isolated and identified as *Madurella grisea*.

CRYPTOCOCCOSIS

ARAGON & REYES²⁸ published the results of laboratory studies on the first case of cryptococcosis in the Philippines verified by cultures. The patient showed involvement of the brain and was operated on for relief of pressure symptoms. Spinal fluid and a piece of brain tissue were submitted for fungus culture. The organism cultured from the specimens proved to be *Cryptococcus neoformans* by its morphological characteristics, its ability to grow at 37°C, its virulence to mice, and its inability to reduce nitrate to nitrite. It was sensitive to amphotericin B.

OTHER DEEP MYCOSES

Proven cases of sporotrichosis, North American blastomycosis, South American blastomycosis, coccidioidomycosis and histoplasmosis have not been reported in the Philippines.

So far, there has been no indication that the Philippines is an endemic area for coccidioidomycosis. In a coccidioidin skin test survey of 824 tuberculosis patients, HALDE & REYES²⁹ did not find a single reactor. The disease has not spared the large numbers of Filipinos who have settled in the endemic areas of California, indicating that Filipinos are not immune to coccidioidomycosis. Together with Negroes and Mexicans, they have been found to be actually more prone to develop the serious, disseminated form of the disease. There is more than the mere possibility that coccidioidomycosis will be encountered among these Filipinos from California who return to the Philippines for visits or retirement, as was brought out in the reported cases of coccidioidomycosis among Filipinos from Hawaii³⁰.

Histoplasmosis, on the other hand, most probably exists in the Philippines. A Philippine case described by STRONG in 1906 and another by WADE in 1926 were considered to be histoplasmosis by MELENEY³¹. STRONG'S case reports antedates even DARLING'S accepted initial description of histoplasmosis. In two histoplasmin skin test surveys^{29,32}, 4.61% of 477 Filipino medical and nursing students and 3.15% of 824 tuberculous patients gave positive reactions. In the neighboring country of Indonesia, 9 to 12% positive histoplasmin reactors among adults were obtained in skin test surveys³³ and actual cases of histoplasmosis have been reported³⁴. A case of histoplasmosis described in the Philippines by MENDOZA³⁵ was later proven, however, to be a generalized infection with *Candida albicans*. In a personal communication, REYES³⁶ mentioned an unpublished case of fatal systemic histoplasmosis in a native Filipino with isolation and identification of the causative organism.

Sporotrichosis has a world-wide distribution and only time and watchfulness on the part of clinicians now determine when cases of sporotrichosis in the Philippines will be discovered.

ATMOSPHERIC FUNGI

With the aim of contributing to the knowledge of the etiology of inhalant allergy in Manila and Quezon City, Philippines, BOCOBO & SUGUITAN³⁷ surveyed the anemophilic fungi encountered in the atmosphere in a one-year period. Spore counts by the culture plate method were made from June 1, 1957 through May 31, 1958. The prevalent atmospheric fungi were *Penicillium*, *Aspergillus*, *Hor-modendrum*, *Pullularia*, *Helminthosporium*, and *Fusarium*. Spores of *Alternaria* were infrequently encountered. The fungal spores were perennially present, with no marked seasonal fluctuation.

The authors suggested the use of extracts of these prevalent atmospheric fungi in skin testing and hyposensitization of patients with inhalant allergy.

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