Ann. Soc. belge Méd. trop.
1974, **54**, 2, 129-140

THREE ROUND TABLES OF MYCOLOGICAL IMPORTANCE

by

R. VANBREUSEGHEM (*) and Ch. DE VROEY (**)

Preface — During the IXth International Congress on Tropical Medicine and Malaria held in Athens from the 14th to the 21st of October 1973, one of us (RV) had the opportunity to organize three Round Tables.

With the aid of Dr N. Nolard-Tintigner, Dr J. Pelseneer-Coremans and Dr M. Takashio, we did contact a number of mycologists around the world. The result is what we present here. We think it can be interesting to many people.

KEYWORDS : Mycoses; Trichophyton rubrum; Trichophyton concentricum; Chromomycosis, Treatment.

ROUND TABEL I

Epidemiology and treatment of *Trichophyton rubrum* and *Trichophyton concentricum* infections

Moderator :

Dr R. Rollier (Morocco).

Introducers :

Prof. Dr Ch. De Vroey (Belgium);
Dr. M. Pereiro-Miguens (Spain).

Discussants :

Prof. Dr P. Dockx (Belgium);
Dr Uranie Marcelou-Kinti (Greece);
Dr Malee Nissaisorakarn (Thailand);
Dr M. Takashio (Belgium).

R. Rollier (moderator) : I open the first Round Table by asking Prof. De Vroey to introduce the subject.

Ch. De Vroey : I will limit myself to the problem of *T. concentricum* as I have seen it in the Fiji Islands. It is remarkable that besides the classical concentrical lesions developed in young cases, there are a much greater number of atypical lesions. At least this is what they could be named if they were not so frequent. The same observation has already been made by Vanbreuseghem but, maybe, the most frequent form is characterized by an extensive desquamation with depigmentation. Besides that Athlete's foot symptoms are often present in people with Tokelau. The prevalence of the disease is rather small in schools, where on 100 children it is usual to find 2 à 3 cases. It is evidently in the family that contamination occurs. It is also evident that the Tokelau children are poorer than the others.

(*) Head of the Department of Microbiology, Institute of Tropical Medicine, Nationalestraat 155, B-2000 Antwerpen, Belgium.

(**) Associate Professor, Mycological Laboratory, Institute of Tropical Medicine, Nationalestraat 155, B-2000 Antwerpen, Belgium.

T. concentricum can be demonstrated on the clothes, blankets and in the air of the dwellings. Flies do not seem to be indifferent to the dissemination of *T. concentricum* as it results from the development of the dermatophyte on culture media where flies deambulated. I have not seen a case of infection of the nails by *T. concentricum.* As far as *T. rubrum* is concerned it is interesting to return to my work with Vanbreuseghem on the geographical distribution of dermatophytes. It is characteristic that *T. rubrum* is exceptionally responsible for ringworm of the scalp, that it is often associated with skin lesions, feet lesions and inguinal area lesions. In Asia and in Latin America the importance of *T. rubrum* as an agent of ringworm of the skin (tinea corporis) is very great but not in Africa. On the contrary in Africa *T. rubrum* is frequently responsible for tinea cruris.

R. Rollier (moderator) : Thank you Prof. De Vroey. May I now ask Dr Miguens to develop his point of view.

M. Pereiro-Miguens : *T. rubrum* is responsible for lesions of the skin in man. It has been only rarely isolated from animals. With *T. mentagrophytes* and *Epidermophyton floccosum* it is the most common agent of ringworm of the skin. Very frequent in Asia and in Latin America, it has increased in Europe since the second world war. In Spain from 1952 to 1972 its frequency has jumped from 8 to 13 p. cent for Tinea corporis, from 12 to 25 p. cent for Tinea cruris, and from 28 tot 33 p. cent for Tinea pedis. The lesions produced in man are usually chronic. The clinical diagnosis is always difficult.

Different pathological conditions favour infections by *T. rubrum* : Cushing, pemphigus foliaceus, leukemia, lymphoblastoma, etc. Treatment with corticosteroïds is always a favouring factor.

There are two types of *T. rubrum* : the downy type, more frequent in temperate countries and the granular or African type. Treatment of lesions produced by *T. rubrum* requires the use of Griseofulvin.

R. Rollier (moderator) : Thank you Dr Miguens. May I now ask Prof. Dockx to add some information.

P. Dockx : The proteolytic activity of *T. rubrum* in the milieu where it develops is much smaller than for *T. mentagrophytes* or *M. canis*. This is perhaps related to the rarity of *T. rubrum* as agent of ringworm of the scalp. On the contrary, some quantity of leucylnaphtylamidase has been detected in the culture media for the three dermatophytes but not in the mycelium. It does not seem that the study of the ultrastructure of *T. rubrum* presents anything interesting on the epidemiology of *T. rubrum* infections. However, I have seen in vacuoles in the *T. rubrum* mycelium, opaque bodies that I have not seen in other dermatophytes.

R. Rollier (moderator) : Thank you Prof. Dockx. May I ask now Dr Kinti to give us her observations in Greece.

U. Marcelou-Kinti : In the daily practice *T. rubrum* is isolated in Greece from approximately 20 p. cent of skin lesions and from 28 to 30 p. cent of Tinea cruris. A recent study of 300 cases of Tinea cruris in soldiers has produced *Epidermophyton floccosum* in 80 p. cent but *T. rubrum* only in 5 p. cent. It must be added that out of 1,000 young soldiers without lesions, 2.8 to 3 p. cent have been found to harbour *T. rubrum* in the inguinal area.

R. Rollier (moderator) : This report on *T. rubrum* infection is indeed interesting. May I ask Dr Nissaisorakarn what are her observations in Thailand.

M. Nissaisorakarn : *Trichophyton concentricum* has not been isolated between 1961 to 1973 in a mycology laboratory in Thailand. On the contrary, during the same period, in 1,535 cases of patients with dermatophytic lesions in Bangkok and the provinces of Bangkok, *T. rubrum* has been isolated from 81 cases. The distribution is as follows : Tinea corporis, 34 cases or 41.97 p. cent; Tinea cruris, 23.5 p. cent; Tinea pedis, 17.3 p. cent; Tinea unguium 12 p. cent; Tinea manuum, 3,7 p. cent and one case only of Tinea capitis or 1.2 p. cent.

The lesions by *T. rubrum* are more frequent in man than in women : 83.9 p. cent for the first one, against 16.1 p. cent for the second one. Most of the cases in man are Tinea corporis.

R. Rollier (moderator) : Thank you Dr Nissaisorakarn. Dr Takashio please.

M. Takashio : I will limit myself to what we know of the sexual state of *Trichophyton rubrum* and of *T. concentricum*. Their sexual state is unknown. However, it is possible to determine the « sex » of the dermatophytes by the technique proposed in 1968 by Stockdale, or by this technique as I have modified it.

I have not had the possibility to investigate this problem for *T. concentricum* but my results with *T. rubrum* show that this dermatophyte is always, mated with the tester strains of *A. simii*, of the negative mating type. This confirms the results obtained in the U. K. by Stockdale and Young.

R. Rollier (moderator) : I thank very much the introducers and the discussants of this interesting problem. May I observe that two dermatophytes, one very close to the other as *T. rubrum* and *T. concentricum*, have a geographical distribution so different : whereas one is invading the world, the other one remains geographically stable. In Morocco I have seen *T. rubrum* in 42 to 60 p. cent of all mycotic skin lesions.

Ch. De Vroey : In Fiji besides *T. concentricum*, the predominant species, *T. rubrum* exists in small quantity.

R. Rollier (moderator) : And is *T. rubrum* not in progress ? I mean compared with *T. concentricum* ?

Ch. De Vroey : As a matter of fact *T. concentricum* is found in Fijians only, whereas Indians remain apparently immune to *T. concentricum*, but they are frequently infected with *T. rubrum*. I have not understood, Dr. Rollier, what it means when you say that *T. rubrum* increases when *T. violaceum* diminishes.

R. Rollier (moderator) : It is not exactly that, but in Morocco ringworm of the skin produced by *T. violaceum* diminishes whereas those produced by *T. rubrum* increase. As a matter of fact both are less important than they were before. The same observation can be made on Tinea capitis as Dr Vanbreuseghem has seen. They are much less developed than in some developing countries.

R. Vanbreuseghem : Maybe !

A. Basset : When I was an undergraduate at the St. Louis Hospital, *T. rubrum* was practically unknown. Now it is identified in 70 p. cent of all the fungi isolated. I do not understand this increase. If it is the standard of life that is responsible for it we have to conclude that an increase in the standard of life favours an increase of *T. rubrum*.

R. Rollier (moderator) : According to my statistics, *T. rubrum* develops only after puberty and finds its peak between 35 and 40. It is not present before puberty or very rare. It diminishes with andropause and menopause. On the contrary *T. violaceum* is pre-pubertian and vanishes after 30-40 years. Have other people made similar observations ?

Dr. Marguerite Basset (France) : In Dakar and in the east of France we have isolated *T. rubrum* only from the skin of adults, never from children, but in Africa I have seen *T. violaceum* on the skin of elderly people.

R. Rollier (moderator) : As our time is up, I have to conclude :

1° For *T. concentricum* we have seen that it is a dermatophyte restricted geographically which from the clinical point of view produces on the skin concentrical and more or less erythrodermic lesions. Besides that there is no production of pus whatever.

2° *T. rubrum* on the contrary presents a much more complex problem. It is an invading fungus. On one hand it invades collectivities all over the world and it also invades the people seen as individuals. This dermatophyte is isolated from every section of the body but with some favouring spots. Statistically it is displacing *E. floccosum* in the inguino-crural and the buttock areas. In countries as Morocco, it is pushing *T. mentagrophytes* out of the feet. Clinically, primoinfections by *T. rubrum* are observed : Herpes circinatum e.g. is easily cured by a local or general treatment. But there are erythematosquamous forms often with a psoriasiform aspect. They are chronic. The resist treatment and they start again in the majority of the cases when you stop Griseofulvin. There is a third form developing during the estival period of the year and it seems that it is related to hygrometry, temperature and humidity. It produces suppuration, specially in clinical forms of which nothing has been said : the forms with « grains de sagou » on the feet, with hand dysidrosis. The dysidrosis is a reaction. These forms in Morocco are more and more frequently encountered.

This is, Ladies and Gentlemen, all that I can say about this which should ask for much longer development. Thank you.

ROUND TABLE 2

Treatment of Chromomycosis

Moderator :

Prof. Dr R. Vanbreuseghem (Belgium).

Introducers :

Dr Margaret Bayles (South Africa);
Prof. Dr D. Borelli (Venezuela);
Dr R. Pradinaud (French Guyana).

R. Vanbreuseghem (moderator) : The importance of the problem is great. The disease is very common in tropical countries and so far very little is

known about its treatment. May I ask Dr Bayles to give us her experience with this problem in South Africa.

M. Bayles : Since 1963 I have been interested in the treatment of Chromomycosis : Amphotericin B, potassium iodide and vitamin D^2 (Calciferol) are the drugs most commonly recommended in textbooks.

From 1965 to 1972, 35 cases of Chromomycosis have been followed in the Department for Dermatology at Durban. Since 1966 I have tried Thiabendazole, Trichomycin, Fanasil, 5-Fluorocytosine and Clotrimazole. Trichomycin and Fanasil have proved to be quite ineffective and we have left them. Clotrimazole is still under our scrutiny. The results that we present here are all about Thiabendazole (Tbz) and 5-Fluorocytosine (5-FC). In 22 patients treated with Thiabendazole I have obtained 8 cures or 36 p. cent : in 12 patients treated with 5-FC I have obtained 3 cures or 25 p. cent. All together that makes 40.7 p. cent cures without relapses for a follow up period of 6 months to 4 years for 27 patients treated.

With the two drugs the improvement is at its best during the three first months; then it is slower, to carry on finally towards cure or stabilization. With both drugs, even when the dosis is increased we have seen in some patients the development of new lesions. In one patient the association of the two drugs has been successful whereas each of them, used separately, had been a failure.

For 5-FC tolerance is perfect but in 6 of the 22 patients treated with Tbz the transaminases and the seric bilirubin have been increased. These reactions returned to normal after treatment was discontinued.

The failure of the treatment, even in cases where the fungus is sensitive *in vitro*, may be explained by the following factors : 1° inadequate blood levels; 2° inadequate tissue levels of the drugs; 3° healing of the lesions of the mycosis with fibrosis preventing the drugs reaching remaining fungal cells; 4° the development of resistance to the drugs; 5° alteration of the structure of the envelope of the fungal cell as a result of treatment; 6° the problem of possible dormancy of the fungal cell induced by unfavourable environment.

Tbz does not meet or produce resistance whereas 5-FC meets and produces resistance.

R. Vanbreuseghem (moderator) : Thank you very much Mrs Bayles. Prof. Borelli will you please give us the results of your work in Venezuela.

D. Borelli : I think that from my experience with Chromomycosis I may conclude that almost every case can cure by appropriate treatment. On 19 cases from Venezuela of which 12 were caused by *Cladosporium carrionii* and 7 by *Fonsacaea pedrosoi*, seventeen were cured with 5-FC. There were two relapses : one of them has been mended with electrodesiccation. The case of the second one is not yet settled. The other possibilities of treatment are limited and often without efficiency : surgery, to be prefered in small lesions, electrodesiccation, heat, X rays, iodine, vitamin D^2 or D^3. I have found that Thiabendazole does not eradicate infection. Tbz used in two human cases and in 48 mice inoculated with *C. carrionii* has been without any success. Maybe the administrative procedure of Amphotericin B could be modified. On the contrary very beautiful results have been obtained in

one to three months with 100 mg/k weight day of 5-FC given in three dosis, exactly every 8 hours for 5 to 8 weeks. The treatment has to be stopped three weeks after the first negative cultures. The follow up has to be maintained for two years but after two months usually the appreciation of the cure is correct. Every week a mycological examination has been done during the treatment and every two weeks, but this is not necessary, an histological examination. I have seen resistance developped with 5-FC. In very resistant cases I suggest to give 200 mg/k weight per day and Amphotericin B intravenously, together with local thermotherapy.

When relapses are apparent, time is precious : they must be immediately electrodesiccated. 5-FC has given also interesting successes in the treatment of 5 cases of Sporotrichosis and in one case of Leishmaniosis on two, with the dosis of 100 mg/k weight per day. Tolerance has also been perfect.

R. Vanbreuseghem (moderator) : Thank you Dr Borelli. I will ask now Dr Pradinaud to give us his experience in French Guyana.

R. Pradinaud : Eleven cases of chromomycosis, all of them caused by *Phialophora pedrosoi*, have been diagnosed so far in French Guyana of which 8 by myself with the collaboration of Prof. Basset and Dr Grosshans. Of these 11 cases there was only one woman. French Guyana is near to Venezuela. Its population is only of 45,000 inhabitants and the area 91,000 km^2. Two cases of chromomycosis infiltrated with Amphotericin B although producing an apparent cure in the beginning, finally failed. On the contrary, of six cases treated with 100 mg/k weight per day of 5-FC, four healed in 2 to 3 months and two have been considerably improved. So far the follow up has been of 3 months to I year. Histological investigation during the treatment shows a reduction of acanthosis with the production of new formed vessels. That explains the ecchymotic aspect of the lesions during the treatment. It is still possible to find some granulomatous lesions. The sclerotic cells themselves are flattened due to the penetration in the cell of 5-FC where it will combine with RNA in the form of Fluoracyl.

R. Vanbreuseghem (moderator) : I thank Dr Pradinaud for his communication and I declare the discussion open.

Dr M. Fernex (Switzerland) : I want more information on the treatment. What is the exact dosis of 5-FC which has been used ? From what I heard it varies from 100 to 200 mg/day. I would also like to know if there has been a local use of 5-FC. From what I heard the cures have been obtained in inpatients. The elimination of 5-FC being complete after 3 to 6 hours it is essential that the antifungal be given quite regularly. If not, the concentration in the blood will fall to such a low level that it will favour the development of resistance. It has been shown that this resistance is considerably favoured by a concentration inferior to 25μg/ml. This is frequent in ambulatory patients.

M. Bayles : For Thiabendazole I used 25 mg/k weight per day. For the 5-FC I used 100 mg/k weight per day. In a few cases when I do not see any real improvement or when new lesions develop I have been giving 200 mg/k weight per day. But actually I have not seen any difference between the

two dosages and usually I have maintained 100 mg/k weight per day. I have not found any advantage in a local treatment with 5-FC alone or combined with another treatment. In 1971 Lopes has done the same investigation and he came to the conclusion that the aspect of the lesion could be of some importance : eczematous and psoriasiform types respond to a local treatment with 5-FC. I have not used the Thiabendazole locally although Batistini had used it in a patient intolerant of systemic treatment. A small lesion was cured after seven months of daily application. All my patients have been treated in the clinic.

D. Borelli : In all the cases, except one where I did use 50 mg and one where I did use 200 mg/k weight per day, I have been using 100 mg/k weight per day. Local treatment is inevitable and increases the local temperature. This alone can have a curative effect but I have never used 5-FC locally. All the patients have been treated in the hospital.

R. Pradinaud : I have used 100 mg/k weight per day. In some patients with flattened psoriasiform lesions I have used 5-FC in ointment but not on very extensive lesions. All my patients have been inpatients.

R. Vanbreuseghem (moderator) : I think I may summarize the use of 5-FC in Chromomycosis : 100 mg/k weight daily to inpatients only. In a few cases there has been a local application of 5-FC.

The discussion continues.

Prof. Dr H. Felix (France) : Is there any difference between the patients followed in South Africa and in Venezuela ? My own experience rests on six patients all treated in Malagasy with the same dosis of 5-FC as the one given by the other authors. I have obtained five cures and one relapse. The patients, once more, were inpatients.

D. Borelli : What was the agent of Chromomycosis in Malagasy ?

H. Felix : Cladosporium carrionii.

R. Pradinaud : I have asked myself also what is the role played by the geographical situation of the patients ? To that I have not found the solution.

Ch. De Vroey (Belgium) : So far only two species have been mentioned. Nobody spoke of *Ph. verrucosa !*

M. Bayles : I have not seen a case by *Ph. verrucosa.* All my patients were infected with *Ph. pedrosoi* with one exception where it was *Cladosporium carrionii.*

D. Borelli : I think that there are more strains of *F. pedrosoi* resistant to 5-FC than strains of *C. carrionii.*

M. Bayles : I agree with that.

D. Borelli : *Ph. verrucosa* is very rare and *Fonsecaea compacta* practically inexistant. In dry tropical countries the agent is *Cladosporium carrionii. Fonsecaea pedrosoi* is ubiquitous.

R. Vanbreuseghem (moderator) : I wonder if the temperature of the countries where Chromomycosis has been observed, could explain the differences in the results obtained in Latin America by Dr Pradinaud and Dr Borelli on one hand and in South Africa by Dr Bayles on the other hand. What would be the temperature in Malagasy ?

H. Felix : About the same as in South Africa.

R. Vanbreuseghem (moderator) : This apparently answers my question.

Marguerite Basset : Dr Borelli waits three weeks to come to the conclusion that a specimen taken on the treated patient is negative. In Strasbourg for treated cases we waited one full month. What is the opinion of Dr Borelli ?

D. Borelli : I think that 3 weeks is enough but in two cases however, the fungus grew after 3 weeks. I must mention that in one of those two cases, the patient healed, although the culture was positive.

R. Vanbreuseghem (moderator) : These observations confirm what we have seen in Africa with *Histoplasma duboisii.* It is often necessary to wait a long time before concluding that the cultures are negative, mainly when the patients have received an important dosis of Amphotericin B.

Rosalinde Hurley : According to Mrs Bayles, there was in some cases hypersensitivity to Tbz, caracterized by elevated transaminases and bilirubin for 7 to 8 weeks. Were any investigations made on viral hepatitis to explain these anomalies and could she tell us again the route used to administer the drug ?

M. Bayles : The oral route was used. The hypersensitivity really was due to the drug. In some patients it returned to normal very rapidly when the drug was stopped but in one it took nearly ten weeks. Subsequently, only one tablet of 500 mg produced the same result : elevated bilirubin and transaminases.

R. Vanbreuseghem (moderator) : I think it is time to put and end to this interesting discussion and to try to summarize the discussion on the treatment of Chromomycosis. I think we may be satisfied that at least two different drugs have proved to be active in Chromomycosis. For some reasons that we do not understand, Dr Bayles has found that Thiabendazole is much more active than 5-FC. On the contrary Dr Borelli considers that Tbz is nearly without activity, that it could be considered at the most, as an adjuvant, but he was able to cure 18 cases on 19 with 5-FC. Dr Pradinaud has not used Thiabendazole. He confirmed the complete inactivity of Amphotericin B in infiltration. Just as Dr Borelli he did obtain the best results with 5-FC. In the discussion Dr Felix reported his results in Malagasy : 5 cures on 6 patients treated with 5-FC.

I am quite satisfied with these results but, personally I wonder why nobody spoke of surgery as a possibility of treatment. However if the diagnosis is made early enough, and indeed not if Chromomycosis is 15 or 20 years old surgery still is a choice type of treatment. Thank you.

ROUND TABLE 3

What is a superficial mycosis ?

Moderator :

Dr Rosalinde Hurley (Great Britain).

Introducers :

Prof. Dr N. Asgari (Iran);
Prof. Dr A. Basset (France).

Discussants :

Dr Jacqueline Pelseneer-Coremans (Belgium);
Dr Nicole Nolard-Tintigner (Belgium).

R. Hurley (moderator) : I am not the ideal person to fulfil this function being neither a mycologist nor a dermatologist. All the same, Dr Asgari, will you please start.

M. Asgari : Dermatologists often divide mycology into superficial and deep seated mycoses. According to « Webster's New International Dictionnary » a superficial mycosis must be a mycotic disease affecting only the surface structure of the skin and not able to penetrate into the tissues situated beneath. Dermatophytoses however generally do not follow the above definition. Most of the dermatophytes invade hairs and nails deeply embedded in the skin and some produce inflammatory reaction in or around the lesions : kerion, minute abscesses, and so on. *Trichophyton schoenleinii* leaves usually deep scars. *Trichophyton rubrum* and *Trichophyton mentagrophytes* in Athlete's foot produce ids on the hands. Epidermophytosis by *E. floccosum* and Tokelau are two exceptional dermatophytoses remaining superficial.

I would limit myself in listing as superficial mycoses :

1° Pityrosporosis including Tinea versicolor and seborreic dermatitis;

2° Epidermophytosis;

3° Piedra : black and white;

4° Otomycosis;

5° Tinea nigra.

R. Hurley (moderator) : Thank you Prof. Asgari. Professor Basset.

A. Basset : To the clinician many mycoses could look superficial as for instance, Chromomycosis. It is clear however, that we cannot be confident in what the eyes see. In practice and for therapeutic reasons we have to reduce the superficial mycoses to mycoses affecting the epidermis and the other keratinized tissues. Eczema marginatum Hebrae, Onyxis, Tinea capitis, Pityriasis versicolor, Tinea inguinalis, Moniliasis, can be placed among the superficial mycoses. Maybe can be even added to them diseases such as Erythrasma which, although caused by *Nocardia minutissima* reacts to antifungal drugs. The problem is complicated by the existence of trichophytic and moniliasic granuloma.

Very schematically I think that we have to maintain as superficial mycoses only those affecting the epidermis and keratinized structures.

R. Hurley (moderator) : Thank you Prof. Basset. May I ask Dr Pelseneer-Coremans to develop her point of view.

J. Pelseneer-Coremans : I will limit myself to one fungal disease : Basidiobolomycosis and show or try to show how it can be accepted as a superficial mycosis.

1° The route by which *Basidiobolus meristosporus* penetrates the body is quite probably superficial.

2° It develops under the skin. The invasion of viscera is quite exceptional : four times on 108 cases published.

On this basis it could be possible to classify mycoses in superficial and deep seated mycoses. However from a scientific point of view I think that it is better to name the mycoses just by their responsible agents. As a matter of fact it is exceptional that, for the same mycosis, either purely superficial or purely deep localized lesions are found.

R. Hurley (moderator) : Mrs Nolard-Tintigner.

N. Nolard-Tintigner : My observations limit themselves to experimental Saprolegniosis in fish. Since 1850 Saprolegniosis has been known as an external mycosis. My own observations have proved that it is a deep seated mycosis.

Observations have demonstrated that Saprolegnias invade epidermis and muscles. Lesions start only when skin has been bruised and motile spores fix themselves to this spot, germinate and invade the skin. Apparently they stop there. However with the use of more specific stains, as for instance the Grocott, it is easy to demonstrate that even the central nervous system and the circulatory systems are invaded by the Saprolegnias. Known as a superficial mycosis, Saprolegniosis is actually a deep localized mycosis. Both names can be used as far as Saprolegniosis is concerned.

R. Hurley (moderator) : I thank the introducers and the discussants who emphasised the complexity of the problem. I declare the discussion open.

J. A. Rioux (France) : It is usual to oppose superficial to deep mycoses. But apparently nothing has been said of intestinal mycoses, of mycoses of the mucosae, of the bronchi. Where will they be placed ?

According to Prof. Basset, superficial mycoses should be limited to epidermic mycoses. What will be the place of mycoses of the intestinal mucosae ?

A. Basset : My point of view is much more practical. To make myself understood, may I ask Dr Pelseneer if it is possible to cure Basidiobolomycosis with an ointment ? I regret that I am not informed on Saprolegniosis.

J. Pelseneer-Coremans : There is no good treatment for Basidiobolomycosis except maybe potassium iodide.

A. Basset : I know indeed that, as Professor Vanbreuseghem said, our definition will always be imperfect. But for dermatologists there are mycoses we may cure with local treatment; even the intestinal mycoses invoked by Professor Rioux may answer to contact treatment. But limiting myself to the therapeutic aspect of the problem, I would consider as superficial mycoses, the mycoses we may cure by the use of a topic. Deep seated mycoses on the contrary require treatment by the enteral or the parenteral

route, even Chromomycosis, superficial though it may seem. I must admit that it is difficult to include in my definition ringworm of the scalp which does not respond to local treatment but well to Griseofulvin.

Prof. Dr J. C. Guilhon (France) : I am afraid that some confusion results from the point of view whether we speak as dermatologist or as mycologist. To define the limits of superficiality, I think it is necessary to say that there are two types of pathogenic fungi : on one side there are those that are able to grow only on or in the skin. It is the case for the dermatophytes of which development is limited to keratinized tissues. These fungi produce superficial mycoses. All the other ones, included Candida, produce deep mycoses.

D. Borelli : When I teach mycology I made a distinction between the mycoses we may classify and the one that we cannot classify because they are able to involve every type of tissues. However it seems quite interesting to distinguish between superficial and deep seated mycoses. For instance superficial mycoses are these which limit themselves to keratinized structures.

However, the clinical symptoms of these superficial mycoses are not strictly superficial since they may produce erythema, pus, vesiculae and even reactions at some distance. All what is under the skin must be considered as deep seated mycoses.

Ch. De Vroey : I wonder why in meetings like this one, it is necessary to divide mycoses into deep and superficial when these problems, as a matter of fact, interest all mycologists. Could we consider that we may be divided in deep and superficial ?

R. Vanbreuseghem : I think that the remark said by Prof. De Vroey is important. As a matter of fact it is the cause itself of this Round Table. Originally in this International Meeting we should have two sections : one devoted to superficial mycoses, the other to deep seated mycoses. As soon as we started it became apparent that I had taken two or three of them in the superficial mycoses that Professor Lacaz, who quite unhappily has not been able to be here, wanted to be placed in the deep seated mycoses. Discussions of this type are permanent and I have not the feeling that we have so far solved the problem.

R. Hurley (moderator) :

Ladies and Gentlemen, I think it is time to make an end to this interesting discussion. I will try to give my point of view on what is a superficial mycosis.

A superficial mycosis is an infection, caused by a pathogenic fungus, limited to the integument, and accompagnied by morbid anatomical changes that are evident to the clinical observer.

This definition excludes diseases such as erythrasma, in which the causative organism is generally accepted to be a bacterium.

The pathogenic fungi are those that have been shown, through clinical and mycological observation, to be associated with disordered anatomy and physiology of the integument, and that, ideally, have been shown, by experiment, to obey Koch's postulates. It is sometimes difficult to establish a pathogenic role for fungi that appear to be endogenous to the skin, and

further experimental work requires to be done. Pityrosporum folliculitis associated with *Pityrosporum ovale*, is an example of this difficulty. Is this fungus pathogenic ? Or is it merely associated with skin disease ?

Some would maintain that only diseases caused by pathogenic fungi with a selective affinity for skin and its appendages should be classed as superficial mycoses, but such a definition would exclude the very common superficial infections caused by *Candida albicans* and other species of Candida. It is probably better to define a superficial mycosis according to the extent of the morbid anatomical lesions.

By the integument, one means the skin and its appendages, and the linings of organs that lead into the body from openings in the skin. Most of these linings are mucous membranes, and all are lined with epithelium. Thus, mycotic lesions of the bronchial mucosa, the gastrointestinal tract and the genito-urinary tract may be superficial mycoses, provided that disease is limited to the lining membranes, and to immediately subjacent structures.

There is some division of opinion about the extent of the morbid anatomical lesions, in mycoses classed as superficial, and it is probably better to consider this in relation, first to the fungus and second to the reaction it evokes. Some take the view that the fungus should be limited to the superficial layers, and that it should not provoke reaction beyond the dermis. This certainly applies to diseases caused by fungi with a predilection for skin and its appendages. Some of the ringworm fungi are seldom observed to penetrate the dermis, for example, the invasive progress of *Microsporum canis* is arrested at the keratogenous zone of the hair bulb. However the geophilic dermatophytes show a potential for adapting to mesochymal substrates, and to penetrate the dermis, *Trichophyton rubrum* is now known to evoke more severe widespread, and deeper reaction than was formely supposed. The full extent of the lesions can only be established by skin biopsy, and even skin biopsies do not sample the hypodermis very deeply. It seems that we must concede that invasion of the dermis occurs, even with species that thrive on the integument, and rarely cause disease beyond it.

The route of entry of the fungus into the tissues is probably important. It is not customary to classify disease such as Chromomycosis as superficial mycosis. The pathological process in this disease extends towards the surface with little tendency to involve deeper local structures; the lymphatics may be involved, and bloodstream metastases may occur. The fungi are not then, specifically adapted to growth on the integument and the general belief is that they are implanted in the dermis, through trauma, and do not enter by invasion of anatomically intact tissues. Contrasting the etiology of the dermatophytoses with that of the deeper subcutaneous fungal infections, it would seem that the route is of primary importance in distinguishing superficial from other mycoses.

The definition of a superficial mycosis may therefore be elaborated. They are fungal diseases of the integument, caused by organisms with a propensity for thriving on epithelium or its appendages, and equipped with enzymes that enable them to penetrate the anatomically integument.

Once again, thank you for your attention and thanks to everybody !